Original Article

Analysis of the Characteristics of Pregnancy and Delivery before and after Implementation of the Two-child Policy

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Abstract

Background: After the two-child policy is fully implemented, new challenges regarding pregnancy management and the treatment of pregnancy complications will arise. The aim of this study was to analyze the characteristics of pregnancy and delivery before and after the implementation of the two-child policy to make suggestions on the quality assurance of the new era of obstetrics.

Methods: In total, 5895 cases of pregnant women who delivered from April 2016 to March 2017 in Peking University Third Hospital served as the study group and 5103 cases of pregnant women who delivered from January to December 2015 served as the control group. The characteristics of pregnancy and delivery were retrospectively analyzed.

Results: In the study group, the percentage of pregnant women who were older (over 40 years) (3.6% vs. 2.2%), were multipara (30.3% vs. 17.0%), received irregular prenatal care (1.5% vs. 0.9%), were transferred for treatment from a subordinate hospital (4.4% vs. 2.8%), and were not residents of Beijing (3.8% vs. 2.2%), were significantly increased compared with the control group ($P < 0.05$). In the study group, the rate of a hypertensive disorder complicating pregnancy (6.4% vs. 5.0%), gestational diabetes mellitus (25.3% vs. 23.1%), dangerous placenta previa (3.0% vs. 2.3%), placental implantation (2.4% vs. 1.8%), and severe postpartum hemorrhage (2.8% vs. 1.9%) was significantly increased compared with the control group ($P < 0.05$). In the study group, the cesarean section rate during primipara was significantly reduced compared with the control group (42.0% vs. 44.2%). However, the rate during multipara was significantly increased compared with the control group ($P < 0.05$). Indications for cesarean section in the study group as well as the percentages of scared uterus and placenta previa were significantly increased compared with the control group ($P < 0.05$).

Conclusions: According to the current situation, better methods are needed to strengthen pregnancy and delivery management, reduce the rate of cesarean section, and ensure a positive outcome for mothers and babies.

Key words: Cesarean Section Rate; Pregnancy Complications; Two-child Policy

Introduction

On January 1, 2016, the two-child policy was implemented countrywide. The quantity of obstetric deliveries increased, and the number of pregnant women with an elder maternal age and history of cesarean section increased. These women did not plan on having two children, but they now plan to have another child after the implementation of the two-child policy. These women will face many new problems, and pregnancy management for these women will lead to new challenges to obstetricians. The 5103 cases delivered from January to December 2015 before implementation of the two-child policy and 5895 cases delivered from April 2016 to March 2017 after implementation of the two-child policy in Peking University Third Hospital were analyzed retrospectively to investigate the characteristics of the pregnancy period and delivery before and after implementation of the two-child policy, make suggestions on the quality assurance of the new era of obstetrics, and offer guiding suggestions for the labor peak, which is likely to continue for several years.

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Methods

Ethical approval

This study was approved by Peking University Third Hospital Medical Science Research Ethics Committee (No. IRB00006761-M2017175); consent form was obtained from all patients in this study.

Study subjects and observation index

In total, 5103 cases delivered from January to December 2015 before implementation of the two-child policy were enrolled as the control group and 5895 cases delivered from April 2016 to March 2017 after implementation of the two-child policy were enrolled as the study group.

All cases were delivered after 28 weeks, and the total number of cases was 10,998. Data including age, prenatal care, pregnancy complications, delivery methods, and indications of cesarean section were retrospectively analyzed.

Standard of disease diagnosis

Labor management and indications for cesarean section are based on expert consensus on new procedure standards and treatment (2014).[1]

Severe postpartum hemorrhage refers to the amount of hemorrhage >2000 ml 24 h after delivery.[2]

Dangerous placenta previa refers to a history of cesarean section and placenta previa of this pregnancy.

The clinical diagnostic criteria of placenta implantation include one or more of the following three items:[3] vaginal delivery, third stage procedures, active treatment, observation for at least 20 min, placental stripping, or freehand dissection. Adhesion between the placenta and uterine wall, difficult surgery, and rupture of the placenta served as criteria for dissection. For cesarean section, the criteria included a stripped placenta, adhesion or manual separation process confirmed by placenta implantation, serious bleeding at the placental site that required sutures to become hemostatic, partial resection of the uterine wall and retention of the uterus, or need for hysterectomy. Pathological examination of the hysterectomy specimen confirmed that the placental tissue was implanted.

Regular pregnancy care: from diagnosis in early pregnancy, the first inspection occurs at 6–8 weeks, checkups occur once every 4 weeks before week 28 of gestation, and every 2 weeks during week 28–36 of gestation, and weekly check-ups occur after week 36 of gestation, for a total of 9–11 prenatal checkups, which should be increased for high-risk pregnant women.

Transfer treatment to our hospital from a subordinate hospital: The Beijing Municipal Health and Family Planning Commission designated 13 rescue hospitals that possess a comprehensive rescue ability for high-risk pregnant women in Beijing city. The county designated 22 comprehensive Grade 3 hospitals that provide corresponding region rescue work to high-risk pregnant women. Our hospital is one of the 13 comprehensive hospitals.

Patients who are not Beijing residents were transferred from a subordinate hospital such as hospitals in Hebei Province, Inner Mongolia, or Shanxi province for treatment. Other critical pregnant women were treated in the emergency department.

Hypertensive disorder complicating pregnancy includes a group of diseases that coexist with pregnancy including elevated blood pressure, gestational hypertension, preeclampsia, eclampsia, chronic hypertension, chronic hypertension, and preeclampsia.

Gestational diabetes mellitus diagnostic criteria:[4] 75 g of oral glucose tolerance test at 24–28 weeks of pregnancy; fasting and postprandial for 1 h and 2 h as 5.1 mmol/L, 10.0 mmol/L, 8.5 mmol/L, respectively. Any blood sugar that meets or exceeds the above standard is diagnosed with gestational diabetes mellitus. Pre-gestational diabetes mellitus including diabetes mellitus diagnosed before pregnancy, or any criteria meets or exceeds the below standard during pregnancy: (1) fasting blood glucose ≥7.0 mmol/L; (2) two-hour blood glucose of 75 g of oral glucose tolerance test ≥11.1 mmol/L; (3) with hyperglycemia, and random blood glucose ≥11.1 mmol/L; (4) glycosylated hemoglobin is ≥ 6.5%.

Fetal distress diagnosis standard:[5] (1) Fetal heart abnormality and fetal heart rate were >160 beats/min or <110 beats/min for more than 10 min with no obvious change, fetal arrhythmia; (2) fetal heart rate monitoring exhibits frequent late deceleration or severe variable deceleration; (3) fetal movement counting, frequent fetal movement, or fetal actuators are reduce and then resolved; (4) detection of amniotic fluid and amniotic fluid abnormalities including Degree II of meconium-stained amniotic fluid, and the amniotic fluid index is ≤8.0 cm or the sheep pool maximum depth is ≤3.0 cm; and (5) intrauterine fetal death, neonatal asphyxia, and neonatal 1- and 5-min Apgar score ≤7. Two or more than two of the above criteria are used to diagnose fetal distress.

Statistical analyses

Statistical analyses were performed using SPSS Statistical software (version 18.0, SPSS Inc., Chicago, IL, USA). Constituent ratio data were evaluated with Chi-square tests. A two-tailed significance test was used for all comparisons, and statistical significance was defined as $P < 0.05$.

Results

Maternal age, delivery condition, prenatal care, and referral system before and after the two-child policy

In the 5103 cases of the control group that included women aged 17–49 years old, 3932 cases (77.1%) were <35 years old, 1058 cases (20.7%) were 35–40 years old, and 113 cases (2.2%) were >40 years old. In the 5895 cases of

the study group that included women aged 16–54 years, 4453 cases (75.5%) were <35 years, 1230 cases (20.9%) were 35–40 years old, and 212 cases (3.6%) were >40 years old. The percentage of pregnant women who were older pregnant, were multipara, were patients who received irregular prenatal care and were transferred from a subordinate hospital, and patients who were not Beijing residents were significantly increased in the study population compared with the control group ($P < 0.05$; Table 1).

Pregnant complications before and after implementation of the two-child policy

After implementation of the two-child policy, the rate of hypertensive disorders complicating pregnancy, gestational diabetes mellitus, immune-related diseases, dangerous placenta previa, placental implantation, and severe postpartum hemorrhage was significantly increased compared with before implementation of the two-child policy ($P < 0.05$). However, no significant difference was noted in the rate of intrahepatic cholestasis of pregnancy between the study group and control group ($P > 0.05$; Table 2).

Delivery method before and after implementation of the two-child policy

After implementation of the two-child policy, the rate of cesarean section was significantly reduced compared with before implementation of the two-child policy ($P < 0.05$). The rate of vaginal delivery was significantly increased compared with that before implementation of the two-child policy ($P < 0.05$), but there was no significant difference in the rate of forceps delivery before and after implementation of the two-child policy ($P > 0.05$: Table 3).

Comparison of the cesarean section rate between primipara and multipara before and after implementation of the two-child policy

After implementation of the two-child policy, the rate of cesarean section in primipara was significantly reduced compared with that before implementation of the two-child policy ($P < 0.05$), but the rate of cesarean section in multipara pregnancies was significantly increased compared with that before implementation of the two-child policy ($P < 0.05$; Table 4).

Changes in major cesarean section indications before and after implementation of the two-child policy

The proportion of scarred uteri and placenta previa was significantly increased after implementation of the two-child policy compared with that before implementation of the two-child policy, and the proportion of abnormal labor processes and multiple pregnancies was significantly reduced compared with that before implementation of the two-child policy ($P < 0.05$). The proportion of fetal distress and breech position cases did not differ significantly between the two groups ($P > 0.05$; Table 5).

Discussion

China is the most populous country in the world. As a result of excessive population growth, the one-child policy became the basic state policy in our country in the 1980s. In recent years, with the emergence of an aging population, the two-child policy was implemented countrywide in January 1, 2016. National Health and Family Planning Commission statistics revealed that 90 million couples met the conditions of the two-child policy. Of note, 60% of women in these couples were 35 years old and 50% of

Table 1: Maternal age, delivery condition, prenatal care, and referral system before and after the two-child policy, *n* (%)

Observations	Study group ($n = 5895$ cases)	Control group ($n = 5013$ cases)	χ^2	*P*
<35 years old	4453 (75.5)	3932 (77.1)	3.46	0.07
35–40 years old	1230 (20.9)	1058 (20.7)	0.03	0.87
>40 years old	212 (3.6)	113 (2.2)	18.21	0.00
Multipara	1786 (30.3)	869 (17.0)	262.92	0.00
Irregular prenatal care	89 (1.5)	47 (0.9)	7.76	0.01
Transferred from a subordinate hospital	261 (4.4)	145 (2.8)	19.35	0.00
Patients who were not Beijing residents	226 (3.8)	113 (2.2)	24.01	0.00

Table 2: Pregnant complication before and after the comprehensive implementation of the two-child policy, *n* (%)

Pregnant complications	Study group ($n = 5895$ cases)	Control group ($n = 5013$ cases)	χ^2	*P*
Hypertensive disorder complicating pregnancy	376 (6.4)	255 (5.0)	9.65	0.00
Gestational diabetes mellitus	1490 (25.3)	1178 (23.1)	7.15	0.01
Immune-related diseases	77 (1.3)	42 (0.8)	5.96	0.02
Intrahepatic cholestasis of pregnancy	25 (0.4)	12 (0.2)	2.91	0.10
Dangerous placenta previa	175 (3.0)	116 (2.3)	5.14	0.02
Placental implantation	140 (2.4)	90 (1.8)	4.99	0.03
Severe postpartum hemorrhage	162 (2.8)	99 (1.9)	7.71	0.01

Table 3: Delivery method before and after the implementation of the two-child policy, *n* (%)

Delivery method	Study group (n = 5895 cases)	Control group (n = 5013 cases)	χ^2	P
Vaginal delivery	3357 (57.0)	2767 (54.2)	8.05	0.01
Forceps delivery	62 (1.0)	79 (1.6)	5.33	0.22
Cesarean section	2476 (42.0)	2257 (44.2)	5.54	0.02

Table 4: Before and after the full implementation of the two-child policy, cesarean delivery rates for primipara and multipara, *n/*N*† (%)**

Groups	Primipara	Multipara
Before implementation	1882/4234 (44.5)	375/869 (43.2)
After implementation	1519/4109 (37.0)	957/1786 (53.6)
χ^2	48.34	25.44
P	0.00	0.00

*The number of cesarean sections; †The total number of patients

women were 40 years old. In the short term, there were a large number of elderly pregnant women and women with a history of cesarean section. Therefore, this article mainly discussed the two aspects of related complications of elderly pregnancy and pregnancy after cesarean section before and after the implementation of the two-child policy.

Maternal age and prenatal care changes before and after the implementation of the two-child policy

In this study, the results showed that after implementation of the two-child policy, women of elder maternal age who delivered in our hospital (over 40 years) increased significantly from 2.2% to 3.6%. The percentage of multiparous women also increased from 17.0% to 30.3%, indicating that after implementation of the two-child policy, many women who previously had no plans to have an additional child during their childbearing years chose to have a second child. In addition, this study showed that patients who received irregular prenatal care and treatment and were transferred from a subordinate hospital were significantly increased compared with those before implementation of the two-child policy, especially regarding the referral of patients who were not residents of Beijing. Irregular prenatal care may involve the following factors. First, elderly multiparous women with previous birth experience. Pregnant women and their families devalued this pregnancy and failed to perform regular care; thus, doctors were unable to identify complications when the patient was seriously ill in a timely manner. Thus, the levels of local hospital diagnosis and treatment were exceeded. Second, the number of elderly multiparous women with scared uteri increased, and pregnancy complications such as dangerous placenta previa and placenta implantation increased. These conditions require a multidisciplinary treatment team and sufficient blood resources. Local hospitals did not have these medical resources, so patients were transferred to a higher level hospital. Third, the local maternal referral system is not perfect. Superior hospitals always refused to receive patients with serious pregnancy complications form subordinate hospital; it is difficult to transfer a patient to a superior hospital. Beijing is surrounded by numerous cities in Hebei province that have abundant medical resources, convenient transportation, and scientific treatment principles that attract numerous patients from Hebei province, Shanxi Province, and the Inner Mongolia Autonomous Region. It is difficult to make a diagnosis and develop a treatment plan because most cases lack complete medical records and inspection results, which not only increases the economic burden of patients but also consumes hospital resources. Therefore, it is essential to strengthen pregnancy health care for the elderly. Every pregnant woman should receive regular prenatal care. Then, early prevention, early diagnosis, and early treatment of pregnancy complications can be provided. The hospital referral system should be improved to ensure the safety of high-risk pregnant women.

Changes in pregnancy complications before and after implementation of the two-child policy

This study showed that after implementation of the two-child policy, the percentages of hypertension and gestational diabetes mellitus were significantly increased compared to before implementation of the two-child policy. The reasons for this finding may be related to the postponement of childbearing. After full implementation of the two-child policy, a large number of older women became pregnant, and the proportion of elderly women increased. Fertility and fertility-related conditions are reduced in elderly women, which increase the incidence of complications in pregnancy. Bartsch *et al*.'s[6] meta-analysis indicates that at >35 years of age, the risk of preeclampsia is increased by 1.2 times. At >40 years age, the risk is increased by 1.5 times. At >50 years of age, the preeclampsia rate is as high as 33.3%. Thus, the higher the age, the higher the incidence of preeclampsia. The factor of age is not only an independent imaging factor of hypertensive disorder but also an independent prognostic factor of gestational diabetes mellitus.[7] Zhu *et al*.'s[8] analysis of 15,194 cases in 15 hospitals in Beijing revealed that the gestational diabetes prevalence rate was 19.7% and diabetes prevalence rate was 1.4%, and age is an independent factor of gestational diabetes mellitus. Caaltincaba *et al*.[9] reported that the prevalence of gestational diabetes was associated with maternal age. Specifically, in women age >40 years, 35–39 years, 30–34 years, 25–29 years old, and 25 years old, the incidences of gestational diabetes mellitus were 35.2%, 16.7%, 8.8%, 7.3%, and 6.6%, respectively. Therefore, pregnant women undergo stronger surveillance during pregnancy. Therefore, pregnancy related-disease should be prevented and diagnosed in a timely fashion, and adverse

Table 5: Changes of major cesarean section indications before and after the implementation of the two-child policy, *n* (%)

Cesarean section indications	Study group (n = 2476 cases)	Control group (n = 2257 cases)	χ^2	P
Scarred uteri	897 (36.2)	575 (25.5)	63.69	0.00
Abnormal labor process	288 (11.6)	378 (16.8)	25.56	0.00
Fetal distress	257 (10.4)	198 (8.8)	3.51	0.07
Breech presentation	257 (10.4)	248 (11.0)	0.46	0.51
Placenta previa	245 (9.9)	184 (8.2)	4.35	0.04
Multiple pregnancies	228 (9.2)	342 (15.2)	39.39	0.00

outcomes of the mother and fetus should be reduced. In addition, there was no significant difference in the rate of intrahepatic cholestasis of pregnancy; the reason may be that the disease is closely related to region, heredity, and so on, but is not related to maternal age.

The serious complications associated with cesarean section are receiving increasing attention, and several studies have demonstrated that a previous cesarean surgery is a risk factor for placental implantation.[10-12] In this study, the incidences of placenta implantation, dangerous placenta previa, and severe postpartum hemorrhage were significantly increased compared with before implementation of the two-child policy. After implementation of the one-child policy in China in 1979 during which a couple could only give birth to one child, many pregnant women chose to have a cesarean section without medical indications at first childbirth regardless of the influence of the surgery on the next pregnancy. One study showed that the cesarean section rate with no medical indications was 13.375%, which accounted for 24.553% of the total cesarean sections. The rate reached as high as 56.347% in some hospitals.[13] Therefore, the rate of cesarean section increased rapidly from the beginning of 1990. In 2010,[14] the WHO surveyed nine Asian countries (21 midwifery institutions including Chinese institutions from three select provinces, display). The Chinese cesarean section rate was as high as 46%, ranking first in Asia. With full implementation of the two-child policy, a significant increase in the number of pregnant women with a history of caesarean section was noted. Cesarean section causes endometrial damage and uterine decidua basalis dysplasia. The placental area increases to ensure fetal nutrition supply, and the scar from the previous cesarean section can also hinder the upward migration of the placenta in late pregnancy, making the pregnant woman prone to severe placenta previa. It is easy to invade the myometrium at the site of placenta stripping and dysplasia, and muscle scar defects at the site of the previous cesarean section cause deep penetration and villi invasion, serosal layers, and penetrating placenta implantation. Severe postpartum hemorrhage often occurs in such patients, and resection of the uterus is often required. In the year after the implementation of the two-child policy, a total of 175 of placenta previa and 140 cases of placenta accreta were admitted in our hospital, accounting for 3.0% and 2.4% of all pregnant women, respectively, which was higher than that of before implementation of the two-child policy (2.3% and 1.8%).

The delivery mode and indications of cesarean section before and after implementation of the two-child policies

Lei *et al*.[13] performed a national survey in 2014 demonstrating China's total cesarean section rate of 54.47%. In some areas, the rate was as high as 71.58%. How to reduce the rate of cesarean section and improve the rate of vaginal delivery has become a difficult problem for obstetricians. New production processes were applied both in the study group and control group in this study. The total cesarean section rate was significantly reduced after implementation of the policy of. The cesarean section rate in primipara decreased, but the cesarean section rate in multiparous women increased to 53.6%. A variety of reasons can explain this finding. First, after complete implementation of the two-child policy, many primipara who plan for two children choose vaginal delivery as the first delivery. Second, publicity and antenatal missions play a positive role in promoting vaginal delivery. Humanization measures, such as family member accompaniment, "Doula" delivery, and painless childbirth, also effectively promote vaginal delivery. Finally, the risk of cesarean section has been gradually recognized and accepted by doctors and patients.

Strictly controlling the indications of cesarean section is the most important measure to reduce the rate of cesarean section. The indications for cesarean section were significantly changed after implementation of the two-child policy. Compared to the situations before fully implementation of the two-child policy, the percentage of abnormal labors decreased and the percentage of scared uteri and placenta previa increased significantly. The percentage of twin pregnancies and breech position pregnancies had no obvious change. Clinical implementation of the new labor standard relaxed the time for labor. Latency is no longer an indication for cesarean section. Full-term pregnancies are allotted for trial production to avoid unnecessary interventions and reduce the labor factors of cesarean section to increase vaginal delivery. Due to the high rate of the previous cesarean section, obstetricians do a careful assessment of the choice of delivery mode for these cases whose can have vaginal delivery trial after cesarean section and should be objective to inform the pros and cons of vaginal delivery trial after cesarean section. If they choose vaginal delivery trial, we should strengthen the monitoring in the delivery process under the conditions of emergency cesarean section and in coordination with

the departments of obstetrics, anesthesia, and neonatal. If they choose cesarean section, we should pay attention to the extension of the uterine incision laceration, placental adhesion, or bleeding in surgery. At present, many domestic and foreign scholars believe that vaginal delivery after cesarean section is safe. Hidalgo-Lopezosa and Hidalgo-Maestre[15] reviewed 39 reports assessing uterine rupture under the conditions of natural labor, oxytocin use, and prostaglandin use. The rates were 0.15–0.98%, 0.3–1.5%, and 0.68–2.30%, respectively. If there are signs of uterine rupture and timely treatment is provided through emergency cesarean section, the general prognosis is better. In 2016, according to research experience at home and abroad in recent years, related guidelines for countries such as the United States, Britain, France, and Canada as well as the Chinese Medical Association and the current situation of our country, the Society of Obstetrics and Gynecology group formulated the "expert consensus" management of pregnancy vaginal delivery after cesarean section.[16] Strictly mastering the indications and contraindications of vaginal delivery after cesarean section, improving the rate of vaginal hysterectomy and vaginal delivery, and reducing the rate of cesarean section are the main goals of the efforts of obstetricians. There was few cases who had vaginal delivery after cesarean section before and after the implementation of the two-child policy in our hospital because of the restriction on the number of cases who had vaginal delivery after cesarean section, rate of vaginal delivery after cesarean section, and complications was not analyzed in this paper, and it will be studied in the future.

In summary, after implementation of the two-child policy, women of older age, women who are multiparous, and women with a history of cesarean section, as well as pregnant complications, increased. During pregnancy, regular prenatal care should be offered. Pregnancy complications should be treated. The referral system for high-risk women and easy access to critical maternal referral should be improved to ensure the safety of pregnant women. Prenatal enhancement of the advantages and disadvantages of vaginal delivery and cesarean delivery should be undertaken. A variety of humane measures should be implemented to promote vaginal delivery. In addition, vaginal delivery techniques should be improved, and the indications of the first cesarean section should be strictly understood to reduce the rate of cesarean section.

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Conflicts of interest

There are no conflicts of interest.

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