The initiation of a neuraxial analgesia service on the rate of cesarean delivery in Hubei, China. a 1-year restrospective study

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Yun ZHAO
Maternal and Child Health Hospital of Hubei Province, Tongji Medical College, Huazhong University of Science and Technology

YING GAO
Maternal and Child Health hospital of hubei province
Corresponding Author

Guoqiang SUN
Maternal and Child Health Hospital of Hubei Province, Tongji Medical College, Huazhong University of Science and Technology

Lin YU
Maternal and Child Health Hospital of Hubei Province Tongji Medical College, Huazhong University of Science and Technology

Ying LIN
Maternal and Child Health Hospital of Hubei Province, Tongji Medical College, Huazhong University of Science and Technology

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Abstract

Background

No Pain Labor & Delivery (NPLD) is a nongovernmental project to increase access to safe neuraxial analgesia through specialized training. This study explores the change of overall cesarean delivery (CD) and maternal request CD (MRCD) rate in our hospital after the initiation of neuraxial analgesia service. Methods The neuraxial labor analgesia was initiated in May 1st 2015. A multidisciplinary NPLD team from America was invited to our hospital to give education and training for 7 days. After training, the application of neuraxial labor analgesia became a routine operation in our hospital, and every parturient can choose to use neuraxial analgesia or not according to her own requirement. The rates of neuraxial labor analgesia (NA), CD, MRCD, intrapartum CD, episiotomy, postpartum hemorrhage (PPH), operative vaginal delivery and neonatal asphyxia of vaginal delivery were analyzed from May 1st 2015 to April 30th 2016. Results The rate of NA in our hospital was getting increasingly higher from 26.1% in May 2015 to 44.6% in April 2016 (p < 0.001); the rate of CD decreased from 50.4% in May 2015 to 36.3% in April 2016 (p < 0.001); the rate of MRCD decreased from 10.8% in May 2015 to 5.7% in April 2016 (p < 0.001). There was a negative correlation between the rate of NA and that of overall CD, r = -0.803 (95% CI -0.951, -0.642, p = 0.002), and also a negative correlation between the utilization rate of NA and that of MRCD, r = -0.790 (95% CI -0.971, -0.497, p = 0.004). The rates of episiotomy, PPH, operative vaginal delivery and neonatal asphyxia in vaginal delivery women and the rates of intrapartum CD, neonatal asphyxia, and PPH in CD women remained unchanged from May 2015 to April 2016. Conclusions Our study shows that the rates of CD and MRCD in our department significantly decreased over a year period (2015 05 ~ 2016. 04), which may be due to the increasing use of NA during vaginal delivery.
Background

In recent decades, the rate of cesarean delivery (CD) has risen markedly in China \(^{[1-5]}\), which has increased from 2.0% (14/701) in 1978–1985 to 36.6% (813/2224) during 2006–2010 \(^{[1]}\). In the recent years, nearly half of all newborns in China were delivered by CD \(^{[2,3]}\). Of all CD cases, 23.2% were performed based on maternal request cesarean delivery (MRCD) rather than on medical indications \(^{[6]}\). Higher rate of overall CD may be associated with increased risk of maternal complications such as infection, hemorrhage, or even death \(^{[6]}\). Many previous researches showed that Chinese women chose CD only to avoid the pain during vaginal delivery, because normally no analgesia will be given during they labor and delivery in China \(^{[2,7]}\). Neuraxial labor analgesia (NA) is a safe and commonly available method in developed countries \(^{[7]}\), which has been recommended as a proactive approach for high-risk parturients during labor \(^{[8]}\). However, in China very few hospitals regularly carry out this approach at present \(^{[3,4]}\). Higher rate of CD and lower rate of NA are China’s major present situation. No Pain Labor Delivery (NPLD) as a nongovernment project was advocated by an anesthesiologist named Ling-Qun Hu, developed at the Northwestern University Feinberg School of Medicine, and launched in 2008. After 10 years of efforts, this project has been supported by many nongovernment organizations from both America and China \(^{[7]}\). Before the use of NA, common services provided in our delivery room include midwives service, accompanying family members, various positions and water immersion during the first stage of labor if patients had requirement (about 20% of them chose water immersion delivery) \(^{[9]}\). With the help of NPLD, NA was regularly carried out in our hospital on May 1st, 2015.

This study was an retrospective study to evaluates the correlation between NA availability
and the rate of overall CD, MRCD, episiotomy, postpartum hemorrhage (PPH), operative vaginal delivery and neonatal asphyxia in vaginal delivery women, and intrapatatum CD and neonatal asphyxia in CD women after regular implementation of NA in our hospital from May 1st, 2015 to April 30th, 2016.

Methods

1. Participants and methods

This study was conducted from May 1st, 2015 to April 30th, 2016 in our hospital, a tertiary- care teaching hospital in Hubei province, located in the central of China.

1.1 Ethical approval

The study protocol was approved by the Ethics Committee of Maternal and Child Health Hospital of Hubei Province (Record number 2015008) on September 23th, 2017. All parturient women requiring the NA service had signed informed consent.

1.2 Preparation stage of NA in our hospital

First, an organizing committee of NA was founded on March 1st, 2015, which consisted 10 members from our hospital, including administrators, anesthesiologists, obstetricians, neonatologist, nurses, midwives, and 3 experts from NPLD team. The three experts were born and studied in China, then immigrated to the United States for further academic development. They were fluent in both Mandarin and English and familiar with Western standards of obstetric care. In our hospital, a meeting is regularly organized 1–2 times a week. Questions would be discussed and communicated with the experts from NPLD through WeChat (the most popular online chat platform in China designed by Tencent Company).

Before May 1st, 2015, Cesarean section could not be carried out in delivery room. The process can be described as that all labor onset pregnant women were generally admitted to hospital in maternity room first, and then moved to delivery room till the dilation of
cervix to 1 cm or more. If intrapartum CD was needed in labor they would be transferred to the general operating room. In our delivery room, the maternal service mode provided family member accompanying, various positions allowed, Daole, midwives during labor, but there were no anesthesiologists and CD could not be carried out. So during labor, no NA could be provided, nearly 20% of them chose water immersion during first stage of labor[^9]. All of the parturient women received bilateral perineal block anesthesia when the fetal head was crowned After delivery, all of postpartum women would be returned to maternal room again.

After May 1st, 2015, with the help of NPLD team via WeChat, NA could be provided every day at any time in any of our delivery rooms. One of our delivery rooms (total 10 rooms) was also set as operation room for CD. There would be an anesthesiologist and an anesthesia nurse on duty every day, two shifts a day, at 8:00am and 17:00 pm, respectively.

1.3 The NPLD program in our hospital

From June 21 to 27 of 2015, a professional NPLD team from American travelled to our hospital for giving us a one-week training. This American team[^7] consisted of 4 obstetric anesthesiology attending physicians, 2 anesthesiology residents, 1 obstetricians, 1 labor and delivery nurse, 1 neonatologist, and 3 interpreters (Supplementary file 1). The NPLD schedule included seven different themes distributed in 7 days, (Orientation Agenda, Mother Safety Day, Baby Safety Day, No Pain Day, Crash Day, Patient Satisfaction Day, and Conference Day). The training was conducted in a typically “hands-on” pattern. First, the trainer from the team gave an overall introduction of the training, and then trainees (Chinese medical stuff) practiced the drills, and the actual care of patients under the under the guidance of the experts from NPLD program, and finally multidisciplinary
deb briefings were held at the end of each day. The practiced drills included 5-minute crash CD, how to deal with neurological complications in labor and delivery room, how to use operation instrument during vaginal delivery, how to reduce the rate of episiotomy, and how to use resuscitation of neonatal asphyxia and so on.

1.4 Data sources

This retrospective study focused on the maternity departemtms of one tertiary- level public hospitals in Wuhan, China. This is a big birth center, the annual number of new born babies was around 20,000 in recent 3 years. The delivery data were collected from the hospitals’ information systems from June 1st, 2015 to July 1st, 2016, and 20,174 deliveries were included in our study, in which 40 cases of incomplete information, 20 cases of abortion before 28 weeks’ gestation, 601 cases of labor induction for fetal malformation, 49 cases of intrauterine fetal death were excluded. Therefore, a complete data of 19,464 cases was included (accounting for of all the data 96.48%). The data set contains information such as demographic data, mother’s age, gravidity, parity, date of delivery, principal diagnosis of maternal or fetal pregnancy-related complications, gestational age at delivery, mode of delivery, primary indications of CD, maternal require cesarean delivery(MRCD), intrapartum CD), whether or not using NA, episiotomy, postpartum hemorrhage (PPH), operation vaginal delivery, intrapartum CD, neonatal asphyxia. (detail shows in Fig 1: Flow Diagram)

In China, CD with medical indications can be divided into CD with absolute medical indications and CD with relative medical indications(for example: age more than 35 years). In our study, MRCD is a cesarean delivery on maternal request at term, which lacks any medical indications of absolute and relative medical indication according to the classification standards above[10,11].

1.5 Neuraxial labor analgesia
All parturient women undergoing vaginal delivery should be evaluated both by anesthesiologist and obstetrician to make sure if they need NA when their cervical dilation more than 1cm. The exclusion criteria included parturient women who had any systemic and local sepsis, had deranged coagulation profile, or had drug allergy (Lidocaine, bupivacaine and fentanyl and so on). The detail records for NA can be listed according to nulliparous or parous, spontaneous labor or medicine induced labor, full-term delivery or premature delivery, nature vaginal delivery or instrument assisted vaginal delivery or intrapartum CD. Except for NA, the other maternal service mode was the same.

Epidural analgesia was initiated in the left lateral decubitus position. A sterile preparation with 1% alcohol iodophor was applied by an anesthesiologist with sterile gloves, hat, and mask after an intravenous infusion was established, and at least 500 mL of Ringer’s lactate solution would be administered by anesthesia nurse. First, a 18-gauge epidural catheter was inserted into the epidural space at the L3-4 or L4-5 interspace by 3 cm deep, and then test was carried out by the injection of 2–3 mL of 2% lidocaine. If no side effect appears, the epidural catheter was connected to a PCEA pump (Master PCA pump, Fresenius Kabi USA, without continuous background infusion). 0.08% Ropivacaine with 2 ug/mL Fentanyl was used as the anesthetic drug. If the drug of the PCEA was finished, another one be reloaded. The every-time automatic injection rate of PCEA was 10 mL with a lockout interval of 1 h. The parturient women were told to press the button, each button pressing would inject 10 mL of drug, and the maximum injection(automatic and manual) limit within 30 min was 30 mL. When the cervical dilation was completed, the PCEA pump was discontinued.

Maternal body was continuously monitored for HR, NIBP and SpO2 throughout the PCEA period, meanwhile the fetal heart rate was monitored continuously as well. The parturient women were supervised by midwife one-by-one, and observed by anesthesia nurse at
regular intervals. Common side effects such as nausea, somnolence, and pruritus were recorded by anesthesia nurses. The PCEA pump was administered by the parturient woman herself according to the instruction of anesthesiologist. Parturient women received exogenous oxytocin to obtain an enhanced labor process when patients need. All fetal and maternal events, therapeutic interventions, outcome of labor, and Apgar score of newborn at 1 and 5 min, PPH, and the mode of delivery were recorded. The analgesia effect was evaluated by visual analog scale (VAS) and numerical rating scale (NRS). The VAS was assessed on a 10 cm horizontal line. The patients were informed that the left end of the scale represented “no pain” and that the right end represented the “most severe pain imaginable”. The patients were then instructed to mark the intensity of pain they were currently experiencing on the line. For the NRS an 11-point scale was used, with “0” representing “no pain” and “10” representing the “most severe pain imaginable.” All pain assessments were performed by the anesthesiologist before and after NA. After delivery, there was an questionnaire survey about labor including the satisfaction with the effect of NA by scanning the code on WeChat.

1.7 all kinds of rates
The rate of neuraxial labor analgesia basically refers to the ratio between the number of neuraxial labor analgesia cases and the number of total vaginal delivery cases.

The rate of CD basically refers to the ratio between the number of CD cases and the number of total delivery cases (including CD and vaginal delivery).

The rate of MRCD mean the ratio between the number of MRCD cases and the number of total CD cases.

The rates of neonatal asphyxia, episiotomy, PPH, operative vaginal delivery in vaginal delivery mean the ratio between the number of these cases and the number of vaginal delivery cases.
The rates of intrapartum CD, neonatal asphyxia, PPH in CD mean the ratio between the number of these cases and the number of CD cases.

1.8 Data analysis

All data were inputted into SPSS software (v.19.0, SPSS Inc, Chicago, IL, USA) for statistical analysis. The Pearson correlation was adopted to evaluate the relationship among observed rates during 12 months. Value r and their 95% CIs were calculated. Cochran- Armitage Trend Test was used to evaluate the change trend of observed rates. All statistical tests were performed with 2-sided P values. If p value<0.05, the difference was considered statistically significant.

Results

2.1 A total of 19464 parturient women were accepted in our hospital from May 1st, 2015 to April 30th, 2016, in which 11182 cases (57.5%) accepted vaginal delivery and 8282 cases (42.6%) accepted CD. There were 15 050(77.3%) nulliparous and 4 414 (22.7%) parous, and the rate of parous remained unchanged over the 12-month study period (p = 0.944). Among those cases, 3869 cases chose NA during labor, but 10 cases failed epidural, 2 cases unintended dural puncture for blood, and 238 cases required interpartum CD for medical indications, finally 3619 cases (32.4%) were nature delivery. Before the use of NA, the average VAS and NRS was 9.2, and then dropped to 3.1 after effective analgesia, which indicates the pain was significantly eased(p<0.001). Those who chose NA were satisfied with the effect of analgesia according to the results of questionnaire survey after delivery.

2.2 The one-year long rates of CD, MRCD, and NA are shown in figure 2 and table 1. The results of Cochran- Armitage testing(Figure 2 were that CD and MRCD rates significantly decreased from 50.4% in May 2015 to 36.3% in April 2016 (p<0.001), and from 10.8% in May 2015 to 5.7% in April 2016 (p<0.001), respectively. Similarly, the rate of NA
increased from 26.1 % in May 2015 to 44.6% in April 2016\((p<0.001)\). There were a negative correlation between the rate of NA and that of overall CD, \(r = -0.803\) (95%CI\([-0.951,-0.642]\),\( p = 0.002\)), and also a negative correlation between the utilization rate of NV and that of MRCD, \(r = -0.790\) (95%CI\([-0.971,-0.497]\),\( p = 0.004\)).

2.3 The change trend of episiotomy, operation vaginal delivery, PPH and neonatal asphyxia in vaginal delivery women

After the implemention of NPLD in our hospital, the monthly rates of episiotomy, operation vaginal delivery, and PPH and neonatal asphyxia of vaginal delivery remained unchanged during 12 months and there was no correlation between neuraxial labor analgesia and the rates of episiotomy, operation vaginal delivery, and PPH and neonatal asphyxia of vaginal delivery. \((Table 2, 3)\)

2.4 The change trend of intrapartum CD, PPH and neonatal asphyxia in CD women

From Table 4,5, it can be found that the monthly rates of intrapartum CD, neonatal asphyxia and PPH in CD women remain unchanged during 12 months, and there is no correlation between the rate of neuraxial labor analgesia and the rates of intrapartum CD, neonatal asphyxia, and PPH in CD women \((p>0.05)\).

Discussion

At present in China, the high CD rate is a social problem. However, there are few hospitals conventionally carrying out NA during delivery and labor to meet the needs of parturient women \([12]\). Many Chinese people think labor pain is normal which is difficult to be avoided for parturient women especially nulliparous, so they choose CD. Under the policy of one-child family from 1979 to 2015, wrong cognitions on delivery were prevalent in China, for example they thought the damage caused by episiotomy and that caused by CD were the same, CD might be less likely to affect the quality of sexual life than vaginal
birth and giving birth by selecting a particular date may more safe. The relative medical indications of CD widely vary all over China, such as pregnancy with high myopia, pregnancy by assisted reproduction techniques, primipara more than 35 years old. Most obstetric centers in China cannot meet the rising expectations of pregnant women, such as lacking the company of family members especially husband, pain analgesia, and emotional support in labor. In recent years, a few Chinese hospitals have started to control the unusually high CD rates with health education, painless delivery, doula delivery and psychological comforting and training programs for midwives and obstetricians. In our birth center, from May 2015 it was normally carried out of NA with the help of NPLD program to relieve labor pain for the needs of maternal. Through our observe we find that the rate of NA also have good correlation with the rates of overall CD and MRCD.

NPLD is a nongovernment project aiming to help Chinese parturient women and their health care providers about the safe and effective use of NA. According to the data collected from Shijiazhuang Obstetrics and Gynecology Hospital where the project was first introduced in 2008, it can be know that the rate of overall CD decreased from 40.5% to 33.6% in the period when the rate of neuraxial labor analgesia increased from 0 to 33.5%. Our results are in accordance with those observational studies by the use of NA with the help of NPLD program. In our study, with the increase of usage of NA, the rates of overall CD and were dropped. At the early stage of NPLD program implementation, the rate of NA was the lowest (26.1%); while the rates of overall CD and MRCD were 50.36% and 10.76% in May 2015, respectively. With the increasing rate of NA to 44.6% in April 2016, the rates of overall CD and MRCD decreased to 36.3% and 5.7% respectively. There was a negative correlation between the rate of NA with the rate of CD or MRCD, and
there was positive correlation between the rate of CD and that of MRCD. Although, the two-child policy was released in October 2015\cite{19}, this policy did not make big influence on the rate of parous in our study, which was still around 22.7% in May 2015 to April 2016. This may be because that the parous were during pregnant period at that time. The labor pain is probably the most severe pain that most women will endure in their lifetime. Neuraxial techniques are accepted as the gold standard for intrapartum labor analgesia\cite{20}. Ropivacaine has a high threshold for cardiovascular toxicity, and it has been reported that low concentration of ropivacaine is extremely safe and effective for labor delivery analgesia\cite{21, 22}. Sia et al.\cite{21} compared the incidence of motor block by reducing the concentration of ropivacaine from 0.2% to 0.125% in PCEA for labor analgesia. They concluded that ropivacaine 0.20% and 0.125% can provide comparable analgesia effect, while the motor block was reduced with 0.125% ropivacaine. Compared with continuous infusion, intermittent bolus administration of mixed drug of ropivacaine 0.1% with fentanyl 0.0002% provides a more efficacious route of drug delivery without adversely affecting maternal safety or satisfaction\cite{23}. Our clinical trial demonstrated that NA according to NPLD project was effective. For NA, the low concentration of mixed drug of 0.08% ropivacaine plus 2ug/ml fentanyl under the arrangement of PCEA pump after the epidural anesthesia was effective. Although the dosing regimens used in our study were relatively low concentration of drugs, they can effectively reduce delivery pain from average 9.2 to 3.1 by VAS and NRS. Neuraxial labor analgesia does not increase the risk of CD\cite{7, 24}, but its impact on operative vaginal delivery and other parturient safety outcomes is still controversial\cite{25-27}. Anwar S\cite{25} conducted quasi-experimental study and found that epidural analgesia did prolong the duration of second stage of labor and increased the instrumental delivery rate (58% vs 12%). Hung TH\cite{26} found after epidural
analgesia, 7260 of 10,175 nulliparous and 2987 of 6677 parous showed increased rates of operative vaginal delivery. Wassen MM [27] found the rate of epidural tripled (from 7.7% to 21.9%) over 10 years span while the rates of CD and operation vaginal delivery did not change much in the Netherlands. This study showed that with the increase of NA rate, the rates of operative vaginal delivery, episiotomy, and PPH and neonatal aphasia of vaginal delivery, and interpartum CD, PPH, neonatal aphasia of CD remained nearly unchanged.

Conclusions

Our study has shown that the rates of CD and MRCD in our department significantly decreased over a year period (2015.05–2016.04). The composite factors including may contribute to the increasing use of neuraxial labor analgesia during delivery and labor for the help of NPLD project, although further study is needed.

Strengths and limitations of this study

1. The study shows the rates of neuraxial labor analgesia and the rate of overall cesarean and maternal requestion cesarean delivery in a big birth center of China. There are about 20,000 new babies very year

2. NPLD team gives help to carry out neurxial labor analgiasia in our hospital. The main limitation of this manuscript is that similar findings have been previously reported from other Chinese hospitals working in conjunction with the NPLD program.

3. However, the data were selected from only one center, a tertiary- care teaching hospital in Hubei province, which can not represent all hospitals from different geographical areas and in different levels in China.

4. During the study period, China’s universal two-child policy was open (2015.10), which may have some influence on our observation.

Abbreviations
CD: cesarean delivery
VD: vaginal delivery
MRCD: maternal request cesarean delivery
NPLD: No Pain Labor Delivery
NA: neuraxial labor analgesia
PPH: postpartum hemorrhage

Declarations

Acknowledgments

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Ethics approval and consent to participate

The study protocol was approved by the Ethics Committee of Maternal and Child Health Hospital of Hubei Province. (Record number 2015008). All parturient women requiring the neuraxial analgesia service had signed informed consent.

Consent to publish

Not applicable

Availability of data and materials

Access to the qualitative data should be given upon request to the corresponding author after taking any necessary precautions to safeguard participants’ privacy and confidentiality.

Competing interests

The authors declare that they have no competing interests

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Authors’ contributions

YZ conceived the study, analyzed the data, interpreted the results, and drafted the manuscript. YG conceived the study, drafted the manuscript. GQS, LY, LY analyzed the data and revised the manuscript. All authors read and approved the final manuscript.

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Tables

Due to technical limitations, Table 1 is only available as a download in the supplemental files section.

Table 2: The rates of NA, neonatal asphyxia, EP, ODV, PPH in vaginal delivery
| Rate of NA | May-15 | Jun-15 | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | p-value |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Rate of neonatal asphyxia | 1.32   | 1.32   | 1.31   | 1.2    | 1.04   | 1.42   | 1.02   | 1.1    | 1.29   | 1.11   | 1.09   | 1.31   | 1.000   |
| Rate of EP | 65.39  | 63.91  | 54.65  | 50.60  | 55.65  | 46.62  | 49.75  | 61.9   | 56.15  | 51.66  | 50.23  | 56.06  | 0.109   |
| Rate of ODV | 3.95   | 1.8    | 1.43   | 3.5    | 1.96   | 2.07   | 2.23   | 1.32   | 1.19   | 0.67   | 1.19   | 0.93   | 0.062   |
| Rate of PPH | 4.61   | 3.96   | 3.4    | 3.5    | 5.99   | 3.38   | 3.45   | 3.86   | 3.67   | 3.45   | 3.81   | 2.99   | 0.545   |

NA: neuraxial labor analgesia;
EP: episiotomy
ODV: operation vaginal delivery (including forceps, vacuum and breech extraction)
PPH: postpartum hemorrhage

Cochran- Armitage Trend Test was used:

Table 3: The relationships between the rate of NA and that of neonatal asphyxia, EP, ODV, PPH in vaginal delivery women

| Rate of neonatal asphyxia | (95%CI) | Rate of EP | (95%CI) | Rate of ODV | (95%CI) | Rate of PPH | (95%CI) |
|--------------------------|--------|------------|--------|-------------|--------|-------------|--------|
| Rate of NA r             | -0.177 | (-0.659 to 0.336) | -0.365 | (-0.773 to 0.177) | -0.461 | (0.719 to 0.076) | -0.271 | (-0.78: 0.15) |
| p                        | 0.581  | 0.243      | 0.131  | 0.394       |

NA: neuraxial labor analgesia;
EP: episiotomy
ODV: operation vaginal delivery (including forceps, vacuum and breech extraction)
PPH: postpartum hemorrhage

The Pearson correlation was used:

Table 4: The rates of interpartum CD, neonatal asphyxia, PPH in CD women
CD: cesarean delivery

PPH: postpartum hemorrhage

Cochran-Armitage Trend Test was used

| Rate of transfer CD | Rate of neonatal asphyxia | Rate of PPH |
|---------------------|---------------------------|------------|
| 7.78                | 1.04                      | 3.63       |
| 7.98                | 1.24                      | 3.57       |
| 8.71                | 1.07                      | 2.68       |
| 8.61                | 1.46                      | 2.63       |
| 9.06                | 0.89                      | 3.57       |
| 9.47                | 1.18                      | 3.99       |
| 8.27                | 1.33                      | 2.81       |
| 10.16               | 1.60                      | 4.21       |
| 8.63                | 1.90                      | 4.68       |
| 9.58                | 1.44                      | 3.83       |
| 9.07                | 1.26                      | 2.65       |
| 8.36                | 1.64                      | 2.79       |
| 8.03                | 0.187                     | 0.916      |

Table 5: The relationships between the rate of NA and that of transfer CD, neonatal asphyxia, PPH in CD women

| Rate of transfer CD | Rate of neonatal asphyxia | Rate of PPH |
|---------------------|---------------------------|------------|
| 0.056               | -0.354                    | -0.351     |
| (-0.451 to 0.636)   | (-0.082 to 0.783)         | (-0.752 to 0.) |
| 0.862               | 0.259                     | 0.263      |

NA: neuraxial labor analgesia;

EP: episiotomy

ODV: operation vaginal delivery (including forceps, vacuum and breech extraction)

PPH: postpartum hemorrhage

The Pearson correlation was used

Figures
Fig 1: Flow Diagram

Enrollment

The parturient women delivering in our hospital (n=20,174)

Excluding
40 cases incomplete information,
20 abortion before 28 weeks’ gestation,
601 labor induction for the reasons of fetal malformations
49 occurrence of intrauterine fetal death

Allocation

Vaginal delivery from electronic medical record (n=11,182)

Cesarean selection delivery (n=8,282)

Vaginal delivery every month
Neuraxial labor delivery every month from excel sheet

Cesarean delivery every month

Analysis

1. The rate of neuraxial labor analgesia and the rate of overall cesarean delivery
2. The rate of neuraxial labor analgesia and the rate of maternal request cesarean delivery
3. The rate of neuraxial labor analgesia and the rate of neonatal asphyxia, no episiotomy, operative vaginal delivery and PPH

Figure 1
Flow Diagram
Figure 2

a-year rates of NA, CD, MRCD trends in our hospital. NA: neuraxial labor analgesia; CD: cesarean selection; MRCD: cesarean delivery on maternal request;

Cochran-Armitage Trend Test was used: the rates of CD, $p < 0.001$, the rates of NA, $p < 0.001$, the rates of MRCD $p < 0.001$.

Supplementary Files

This is a list of supplementary files associated with the primary manuscript. Click to download.

data and materials.xls
Table 1.jpg
supplement file 1.docx