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Factors Related to Cesarean Section Indication in Nulliparous Pregnancies: A Cross-sectional Study from Central Vietnam

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Abstract

Objectives: Cesarean section in nulliparous women leads to the repeat of cesarean section in the subsequent pregnancies. This study aimed to identify the indications and related factors of cesarean section in nulliparous women in Central Vietnam.

Methods: A cross-sectional prospective study was conducted on 2482 nulliparas who had undergone either cesarean section or vaginal delivery at the Hue University Hospital from July 2016 to June 2017. The indicators of cesarean section were classified by maternal, fetal, or placental and umbilical cord abnormalities. Factors related to maternal complications and neonatal outcomes were further analyzed.

Result: The cesarean section rate was 41.9%. The fetal condition (40.4%) and the medical conditions of the mother and fetus (28.4%) were the major obstetric indications for cesarean section. There was a significant association between an increased cesarean section rate and the following factors: Maternal age, gestational age, duration of admitted hospital stay before delivery, hypertension, abnormal cardiotocography, number of fetus and fetal weight. Besides, history of infertility treatment and social reasons were also indicators for cesarean section.

Conclusion: Indications for cesarean section in nulliparous women were widely observed in Vietnam owing to specific maternal factors and fetal status

Keywords: Cesarean section; Nulliparous; Pregnant women; Vietnam

Introduction

Cesarean Section (CS) rate is progressively increasing worldwide, in both high-income and low-income countries, resulting in the rise in the occurrence of maternal and neonatal complications [1-4]. Cesarean deliveries are not only associated with prolonged hospitalization, higher cost and maternal morbidity, but also affect the subsequent pregnancies. Cesarean scar pregnancy, cesarean scar defects and uterine rupture are commonly observed after a CS [5,6]. In addition, the prevalence of newborn complications is higher after a CS: Respiratory problems, neonatal intensive care unit and allergies in childhood [7,8]. Since 1985, the rate of CS recommended by the World Health Organization (WHO) has been below 15%. A WHO survey from 2004 to 2008 reported a 25.7% of average global CS rate, of which 19.0% took place in Europe, 29.2% in Latin America and 27.3% in Asia [9,10]. In United States, the rate of primary and total CS delivery increased rapidly from 1996 to 2011 [2]. In China, according to a multi-center cross-sectional study in 39 public hospitals from 14 provinces, the CS rate was 54.5% in 2011, substantially higher than the figure of 46.2% found in the 2008 WHO study [11,12]. Globally, the growth in CS rate has become a public health concern.

In Vietnam, the CS rate increased from 5-6% in the 1960s to 35.6% in 2008 and this incidence has risen in most hospitals in Vietnam [13]. The problem is that CS in nulliparous women leads to the repeat of CS in the subsequent pregnancies. This further increases the risk for placenta previa, placenta accreta and intra-abdominal adhesions [14-16]. It is therefore important to find strategies to reduce CS in nulliparous women. This study was conducted to identify the incidence of CS and to investigate the common reasons for the indications and outcomes of CS in nulliparous women in Central Vietnam.

Materials and Methods

Study setting and design

This was a cross-sectional prospective study of a total of 2482 nulliparous women who had undergone either CS or vaginal delivery at the Hue University Hospital in Vietnam from July 2016 to June 2017. Inclusion criteria required only nulliparous women without a history of preterm birth or surgery on the uterus. Pregnant women who were transferred to another hospital because of any reason and cases with any missing information were excluded from the study.

Data collection and analysis

Variables: The main variables that defined the participants in this study were age, geography, occupation, parity, gestational age, medical history, history of previous pregnancy and gynecologic disorders, duration of hospitalization until CS, antenatal care and stages and types of labor (spontaneous or induced). We examined fetal presentation, fetal position and fetal heart rates. The indications for CS included maternal-related indications (cephalopelvic disproportion, pre-eclampsia/eclampsia, failed induction and obstructed labor), fetal-related indications (fetal distress, breed/malpresentation, multiple gestations) and placenta- and umbilical cord-related indications. Studied outcomes were delivery mode, fever, incidence of hypertension, neonatal characteristics including sex, weight, respiratory failure, neonatal inflammation and maternal complications including hemorrhage, complicated laceration and post-partum infection.

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Statistical analysis: Continuous variables are presented as the mean ± the standard deviation unless otherwise stated. All statistical analyses were performed using SPSS for Windows Version 20 (SPSS Inc, Chicago, IL). A 2-tailed P-value of less than 0.05 was considered significant. This study was approved by the Ethics Committee, Hue University of Medicine and Pharmacy, Hue, Vietnam.

Ethical consideration: This study was approved by the Ethics Committee of the Hue University of Medicine and Pharmacy. Confidentiality and personal privacy were respected in all levels of the study. Collected data will not be used for any other purpose.

Results

There were 1040 cases of CS delivery, which accounted for 41.9% of the 2482 nulliparous pregnancies, compared with 1442 cases (58.1%) of vaginal delivery.

Our analysis revealed that among women undergoing CS, 84.7% were between 20 and 35 years old, 60.6% lived in rural areas and 39.2% belonged to the workers and farmers group. The most often observed length of hospitalization before CS was of one day (39.2%). Their medical history during pregnancy included internal disease (9.7%), surgery (2.9%), one abortion (4.9%), two or more abortions (2.9 %). Most factors between both groups were not significantly different, except for maternal age and the number of hospitalization days for labor (Table 1).

The most common indication for CS was fetal distress in 257 cases (24.7%), followed by cephalopelvic disproportion and obstructed labor, accounting for 132 (12.7%) and 85 (8.2%) cases, respectively. The least common causes were cord prolapse and placenta previa/abruption, which were only identified for 2 (0.2%) and 5 (0.5%) cases, respectively (Table 2).

Only 112 (10.8%) of the 1040 CS cases involved maternal complications, in which 90 cases (80.4%) took place during the intrapartum period, in contrast with 22 (19.6%) during the postpartum period. The most common complication was intrapartum hemorrhage (7.1%), followed by postpartum infection (1.5%). Maternal complications were not different between CS and vaginal delivery (8.7% *vs.* 9.9%). Regarding fetal outcomes, 545/1040 (52.4%) newborns were male in the CS group and three-quarters (75.0%) of them weighed between 2500 and 3500 grams. Neonatal resuscitation was required in 47/1040 (4.5%) cases of CS. Neonatal sepsis occurred in 68/1040 (6.5%) cases of CS (Tables 3 and 4).

Characteristics		Cesarean section n=1040		Vaginal delivery n=1442		p
		n	%	n	%	
Geography	Urban	410	39.4	532	36.9	>0.05
	Rural	630	60.6	910	63.1	
Occupation	Office-work	201	19.3	210	14.6	>0.05
	Business work	150	14.4	178	12.3	
	Worker/ farmer	401	38.6	689	47.8	
	Housewife	204	19.6	229	15.9	
	Others	264	24.4	136	9.4	
Maternal age	<20	97	9.3	112	7.8	<0.001
	20-35	881	84.7	1308	90.7	
	>35	62	6.0	22	1.5	
Number of days hospitalized for labor	1 day	408	39.2	701	48.6	<0.001
	2 days	301	28.9	432	30.0	
	≥ 3 days	331	31.8	309	21.4	
Medical history	Internal disease	101	9.7	128	8.9	>0.05
	Surgery	31	2.9	35	2.4	
	Abortion once	51	4.9	72	5.0	>0.05
	Abortion ≥ 2 times	30	2.9	28	1.9	

Table 1: General characteristics of nulliparous pregnant women with cesarean section and vaginal delivery.

Indications	No. of patients (n=1040)	%
Maternal		
Cephalopelvic disproportion	132	12.7
Pre-eclampsia/Eclampsia	35	3.4
Failure labor induction	78	7.5
Obstructed labor	85	8.2
Non–progress of labor	48	4.6
Severe maternal diseases	25	2.4
Fetal		
Fetal distress	257	24.7
Breed/malpresentation	55	5.3
Macrosomia	84	8.1
Multiple gestations	25	2.4
Placenta and umbilical cord		
Tumor previa	8	0.8
Placenta previa/abruption	5	0.5
Cord prolapse	2	0.2
Oligohydramnios	68	6.5
Umbilical cord abnormalities	32	3.1
History of infertility treatment	55	5.3
Social reason (CS on demand)	46	4.4

Table 2: Indications for cesarean section in nulliparous pregnant women.

Maternal complications		CS		Vaginal delivery	
		n	%	n	%
Intrapartum	Bleeding	74	7.1	102	7.1
	Complicated laceration	12	1.2	38	2.6
	Nearby organs injury	2	0.2	1	0.1
	Others	2	0.2	2	0.1
	Total	**90**	**8.7**	**143**	**9.9**
Postpartum	Urinary retention	3	0.3	6	0.4
	Infection	16	1.5	12	0.8
	Postpartum bleeding	2	0.2	3	0.2
	Others	1	0.1	1	0.1
	Total	**22**	**2.1**	**22**	**1.5**

Table 3: Distributions of maternal complications after cesarean section and vaginal delivery.

Neonatal characteristics		CS		Vaginal Delivery		p
		n	%	n	%	
Sex	Male	545	52.4	732	50.8	>0.05
	Female	495	47.6	710	49.2	
Birth weight	≥ 3500 g	328	31.5	198	13.7	<0.001
	2500-3500 g	637	75.0	1142	79.2	
	<2500 g	75	7.2	102	7.1	
Neonatal resuscitation	Yes	47	4.5	51	3.5	>0.05
	No	993	95.5	1391	96.5	
Neonatal sepsis	Yes	68	6.5	96	6.6	>0.05
	No	972	93.5	1346	93.4	

Table 4: Distributions of fetal outcomes after cesarean section and vaginal delivery.

Discussion

Due to the increased safety of CS, the increase in its global rates during the past decades has raised public health concern regarding the appropriate usage of the procedure. The increase and immense variation among countries' regions and hospitals have been persistent over the years. In our study, there were 2482 nulliparous pregnancies and the prevalence of CS in this group was 41.9%.

In South East Asia, the proportion of CS among countries varied from 19% to 35. At 41.9%, the incidence of CS in our study was also slightly higher. This could be because the Hue University Hospital is a provincial hospital where most of the high-risk pregnancies in the area are examined and managed. Moreover, the prevalence of CS depends on social characteristics and policies of hospital in managing high-risk pregnancies such as pre-eclampsia, intrauterine growth restriction, application of assisted vaginal delivery and consideration of maternal wishes. The rate in our study was similar to that reported in studies by Kambo et al. (42.0%), Benzouina et al. (38.95%) and Moges et al. (36.4%) [17-19]. Besides, the CS percentage was up to 46.2% in China and 33% in United States, both higher than the ideal rate recommended by the WHO (10-15%) [11]. Indeed, the trend of CS is widely increasing worldwide.

In our study, the most common indication for CS was fetal distress in 24.7% cases, which coincided with previous studies performed by Benzouina et al. (30.49%), Kattel (29.3%) and Bhandari (42.6%) [18,20,21]. Meanwhile, other works have reported that the most common indication for CS was cephalopelvic disproportion (38.1%) in Ayano et al. non-progression of labor in studies by Nnadi et al. (25.7%) and Grace et al. (37.4%) and obstructed labor in a study by Ugwa et al. (31.7%) [8,19,22-24]. The high rate of indication of CS due to fetal distress in our study also resulted from the more complicated pregnancy transferred from commune-level health centers.

There were 10 cases accounting for the estimated 0.9% of CS that were elective cesarean delivery on maternal request. That was similar to the data from United States, averaging less than 1-2% [1]. The reasons why women request a CS are complex and often influenced by concerns regarding the safety of their babies, socio-cultural factors, media and body image [25-28]. In our study, the reasons for cesarean delivery on maternal request included fear of specific elements of labor and concern for fetal or maternal morbidities attributed to vaginal delivery. Other medical histories, including obesity, diabetes mellitus and old maternal age, partially explained the increased rate of CS.

In the studies by Grace et al., Nnadi et al. and Kattel et al., the most common complication encountered was postpartum hemorrhage (PPH) with respective incidences of 1.49%, 7.94% and 4.9%, which were comparable to the 7.1% observed in our study [8,20,23]. In contrast, wound infection accounted for 2.1% cases in a study by Bhandari and puerperal sepsis in 2.2% in a study by Kalisa et al. [7,21]. High rate of PPH may be associated with uterine atonicity, resulting from prolonged obstructed labor and cesarean deliveries performed by inexperienced doctors. Proper supervision and adequate attention to hemostasis, along with liberal use of uterotonics and prostaglandins, should be encouraged.

The sex ratio of male to female newborns in this study was 1.1:1, similar to that reported in previous studies by Nnadi et al. (1.2:1) and Benzouina et al. (1.1:1) [8,18]. Most newborns in the group of CS were singleton (97.6%) and 31.5% newborns had birth weight over 3500 g. There were 3 cases of preterm delivery (0.3%) because of placental abruption and severe fetal distress during labor and insufficient postoperative resuscitation. This study found a significant correlation between the increased fetal weight and indication of CS.

Limitations of Study

There is a limitation in the design of this study, as it is not possible to determine whether the CS rate is higher nulliparous women than others. To the best of our knowledge, there are no previously published data from Vietnam about the incidence of CS in nulliparous women. Further studies are necessary for between-group comparisons in order to comprehensively identify the factors associated with the increased rate of CS.

Conclusion

In conclusion, although the reported incidence of CS in nulliparas was still varies worldwide, the rate of CS in our study was higher than that recommended by the WHO for developing countries. The major reasons explaining this high rate were maternal factors and fetal status. The study found a correlation between CS indication and the following factors: Maternal age, gestational age, pre-labor hospitalization duration, hypertension, gestational age, fetal heart rate and fetal weight.

Declarations

Disclosure

The authors alone are responsible for the content and writing of this article. This research did not receive any specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflicts of interest

The authors report no conflicts of interest.

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