DOI: 10.7860/JCDR/2017/24891.10239

Original Article

Obstetrics and Gynaecology Section

Maternal Outcomes Associated with Caesarean versus Vaginal Delivery

FARNAZ ZANDVAKILI[1], MASOMEH REZAIE[2], ROONAK SHAHOEI[3], DAEM ROSHANI[4]

ABSTRACT

Introduction: To choose the best mode of delivery (vaginal versus caesarean section) still remains a contentious issue. Caesarean section is a major abdominal surgery with its related medical, anesthetic and surgical complications. Maternal mortality and morbidity is higher in caesarean section compared with vaginal delivery. The most common causes of maternal mortality during caesarean section are due to anesthesia, bleeding and infection.

Aim: The aim of this study was to determine the mode of delivery and maternal outcomes in Sanandaj's hospital, Iran, during one year.

Materials and Methods: The study population included all women who were admitted for delivery in Sanandaj's Hospital. Data collection instrument was a researcher made questionnaire. Data were entered into SPSS version 20.0 and analyzed using Chi-square test. Desired outcomes were entered into multiple logistic regression models. For estimating the parameters and increasing the level of significance we used bootstrap to generate 1000 samples.

Results: During the study, a total of 5984 deliveries were conducted in Sanandaj Hospital, of which 3423 (57.20%) were vaginal (vaginal, vaginal + episiotomy, instrumental delivery) and 2561 (42.80%) were caesarean section. The results showed a statistically significant association between delivery mode and demographic variables such as age, occupation and level of education; whereas, no significant association was found between place of residence and parity.

Conclusion: The finding of this study showed that caesarean section delivery rate in Sanandaj was 42.80% in 2012-2013 which is higher than caesarean section rate recommended by WHO. Also, there was a relationship between mode of delivery and maternal outcomes.

Keywords: Bleeding, Hysterectomy, Perineal laceration, Uterine rupture

INTRODUCTION

Providing, maintaining and promoting a mother's and infant's health always holds a significant importance [1]. Mortality rate, maternal and neonatal health and related indicators reflect health status of every society [2]. Prevalence of vaginal delivery and caesarean section in pregnant women of a given state is one of the indicators of a mother's health assessment [3].

To choose the best mode of delivery (vaginal versus caesarean section) still remains a contentious issue [4-7]. There is dearth of evidence, indicating major benefits of caesarean section but still, rates of caesarean section have increased steadily over the last three decades in almost all the countries, especially among the middle and higher income groups [8]. Increased rate of caesarean section is not limited to a specific geographic area and in the most areas of the world, including developing countries, is higher than 15% as recommended by World Health Organization [2].

Caesarean section is a major abdominal surgery with its related medical, anesthetic and surgical complications. Maternal mortality and morbidity is higher in caesarean section compared with vaginal delivery [9]. Problems associated with caesarean section lies in its economic costs. Mean length of hospitalization for vaginal delivery is half the mean length of caesarean section which is one of the economic benefits of vaginal delivery [10]. Since caesarean section has increased the length of hospital stay and surgical complications, it affects quality of life of those women who go under caesarean section. Also, mortality and maternal complications of caesarean section is several times higher than vaginal delivery, increasing its postpartum mortality rate with no improvement in its complications [10, 11].

Uteroplacental bleeding disorders, including the risk of abruptio placentae and placenta previa in women with caesarean section have been reported as high [12]. After a major scar of first caesarean risks of intrauterine fetal death is higher [13].

In previous studies, medical complications associated with caesarean section delivery were studied and most of them have shown greater risk of major complications in women who give birth by caesarean section compared with those who have vaginal delivery [14-17]. Therefore, the aim of this study was to determine mode of delivery and maternal outcomes in Sanandaj Hospital during one year.

MATERIALS AND METHODS

The present prospective study was conducted to evaluate the relationship between mode of delivery and maternal outcomes in labor ward of Sananadaj Hospital from May 2012 to May 2013. The study population included all women who were admitted for labor in Sanandaj's Hospital. Sanandaj is the capital of Kurdistan province in Western Iran.

The inclusion criterion incompasses; patients who underwent caesarean section and operative vaginal delivery. Exclusion criteria were expulsion of the fetus before the 20th week of pregnancy (abortion). Data collection instrument was researcher made questionnaire and was composed of three parts: the first part was related to demographic characteristics of participants (age, education, occupation, place of residence, parity), the second part was related to the problems associated with current pregnancy, and the third part included different modes of delivery (vaginal, vaginal + episiotomy, caesarean delivery, operative vaginal delivery) and maternal birth outcomes until discharge (bleeding, laceration, rupture of cervix, abnormal placental adhesion, consumption of

antibiotics, blood transfusion, hysterectomy, admission to ICU and maternal mortality).

For content validity, the questionnaires were given to three obstetrics and gynecology specialists and three midwifery lecturers and necessary modifications were made on the questionnaire based on their recommendations. The reliability of questionnaire was determined by Cronbach's alpha (r =0.88).

After approval of Ethical Committee of Kurdistan University of Medical Sciences and permission of hospital authorities, two trained midwives collected the data.

STATISTICAL ANALYSIS

Data were entered into SPSS version 20.0 and analyzed using chi-square test. Desired outcomes were put into multivariate logistic regression. The model consists of four levels of delivery: vaginal (reference group), vaginal + episiotomy, caesarean section delivery and operative vaginal delivery. Insignificant variables were removed one by one and only significant variables remained thereafter. The importance of this model was to estimate the independent effect of caesarean section compared with vaginal delivery on the outcomes. Increased risk of caesarean section was verified by OR with a 95% confidence interval. To estimate the parameters and significance levels more accurately, bootstrap technique and a sample size of 1000 were used. The p-value of less than 0.05 was considered as statistically significant in all stages of the study.

RESULTS

During the study, a total of 5984 deliveries were conducted in Sanandaj's Hospital, of which 3423 (57.20%) were vaginal (vaginal, vaginal + episiotomy, operative vaginal delivery) and 2561(42.80%) were caesarean section. The method of delivery differed significantly by age, occupation and level of education. Women aged more than 36 years old, employed and having university education were more likely to undergo caesarean delivery. [Table/Fig-1].

Characteristics	Vaginal N(%) 1285	Vaginal + Episiotomy N(%) 2056	Operative N(%) 82	Caesarean N(%) 2561
Age				
15-20	153(11.9)	196(9.53)	24(29.27)	230(8.98)
21-25	328(25.53)	640(31.13)	8(9.76)	657(25.65)
26-30	389(30.27)	665(32.34)	29(35.36)	747(29.17)
31-35	235(18.29)	421(20.48)	9(10.98)	580(22.65)
≥ 36	180(14.01)	134(6.52)	12(14.63)	347(13.55)
Education				
Illiterate	56(4.36)	289(14.06)	44(53.66)	179(6.99)
Primary school	926(72.02)	987(48.01)	22(26.83)	959(37.45)
Diploma	236(18.37)	652(31.71)	12(14.63)	930(36.31)
University	67(5.21)	128(6.23)	4(4.88)	493(19.25)
Job Status				
Housewife	1092(84.98)	2041(99.27)	36(43.91)	2419(94.46)
Employed	193(15.02)	15(0.73)	46(56.09)	142(5.54)
Residence				
Urban	1128(87.79)	1989(96.74)	51(62.19)	1037(40.49)
Rural	157(12.21)	67(3.26)	31(37.81)	1524(59.51)
Parity				
Primipara	749(58.29)	1660(80.74)	21(25.61)	650(25.38)
Multipara	536(41.71)	396(19.26)	61(74.39)	1911(74.62)

[Table/Fig-1]: Characteristics of the study population (N= 5984).

The results showed that maternal complication rate in Sanandaj were 101.8 in 1000 deliveries. In total, maternal morbidity by caesarean section was 10.86% vs 8.2% that of vaginal delivery. There was a statistically significant association between mode of delivery and outcomes such as bleeding rupture of cervix, use of antibiotics and hospitalization in ICU. However, no statistically significant association was found between mode of delivery and outcomes such as perineal laceration (p=0.107), uterine rupture (p=0. 481), abnormal placental adherence (p=0.593), blood transfusion (p= 0.519), hysterectomy (p=0.353) and maternal mortality (p=0.911) [Table/Fig-2].

Outcomes	NVD*	NVD+ Epi**	Caesarean	Operative vaginal delivery	p-value
Bleeding	54	77	58	2	0.002
Perineal laceration	1	5	0	0	0.107
Cervical laceration	3	8	1	2	<0.001
Uterine rupture	0	0	0	0	0.481
Abnormal placenta adhesion	0	3	4	0	0.593
Using antibiotic	46	57	246	1	0.000
Blood transfusion	7	8	7	0	0.519
Hysterectomy	2	0	3	0	0.353
Admission to ICU	2	3	6	1	0.030
Maternal death	0	1	1	0	0.911

[Table/Fig-2]: Association between mode of delivery and maternal outcomes.
*Normal Vaginal Delivery
**Normal Vaginal Delivery + Episiotomy

We used multinominal logistic regression models during which vaginal delivery was chosen as the base group, vaginal delivery + episiotomy as the second group, caesarean delivery as the third group and instrumental delivery as the fourth group. Significant variables including bleeding, perineal laceration rupture of the cervix, antibiotic use and hospitalization in the ICU entered into the model and was analyzed at different levels. Multinominal logistic regression showed that the risk of bleeding during vaginal delivery + episiotomy (OR 0.69, 95% CI, 0.439-1.076) was higher than caesarean section (OR 0.40, 95% CI, 0.25-0.65). Risk of perineal laceration in vaginal delivery + episiotomy was five times higher than vaginal delivery (base) (OR 5.83, 95% CI, 0.02- 1653.828). Risk of perineal laceration for caesarean section delivery and operative vaginal delivery were not calculated because there were no cases of perineal laceration [Table/Fig-3].

Maternal Outcomes	n/N (%)	Adjusted OR (95% CI)
Bleeding:		
NVD (reference)	54/1285 (4.51)	1
NVD+ Epi	77/2056 (3.48)	0.687 (0.439-1.076)
Caesarean	58/2561 (2.29)	0.404 (0.250-0.653)
Operative Vaginal delivery	2/82 (4.08)	0.366 (0.019-6.99)
Perineal Laceration:		
NVD (reference)	1/1285 (0.08)	1
NVD+ Epi	5/2056 (0.23)	5.83 (0.021-1653.82)
Caesarean	0/2561 (0)	Not estimated
Operative vaginal delivery	0/82 (0)	Not estimated
Cervical laceration:		
NVD (reference)	3/1285 (0.25)	1
NVD+ Epi	8/2056 (0.36)	0.919 (0.258-3.28)
Caesarean	1/2561 (0.03)	0.701 (0.1-4.7)
Operative vaginal delivery	2/82 (4.08)	0.000 (0.000-0.000)
Using Antibiotics:		
NVD (reference)	46/1285 (3.85)	1
NVD+ Epi	57/2056 (2.57)	0.803 (0.537-1.202)
Caesarean	246/2561 (9.74)	3.175 (2.27-4.45)
Operative vaginal delivery	1/82 (2.04)	0.757 (0.119-4.81)
Admission to ICU:		
NVD (reference)	2/1285 (0.16)	1
NVD+ Epi	3/2056 (0.13)	669613.375 (3.733E-217 -1.201E+228)
Caesarean	6/2561 (0.24)	601.592 (2.791E-220 – 1.297E+225)
Operative vaginal delivery	1/82 (2.04)	0.004 (0.004-0.004)

[Table/Fig 3]: Association between mode of delivery and maternal outcomes.

The results of this study also showed that the risk of cervical rupture in vaginal delivery + episiotomy was higher than the other modes of delivery. OR for "use of antibiotics" in caesarean section was 5 times greater than other modes of delivery [Table/Fig-3] (OR 3.18, 95% CI, 2.27-4.45). In addition, vaginal delivery + episiotomy was significantly increased the risk of hospitalization in ICU compared with other mode of delivery [Table/Fig-3]. The results from bootstrap technique used in this model show that estimation of parameters were exact and had precision.

DISCUSSION

The findings of this study showed that caesarean section delivery rate in Sanandaj was 42.80% in 2012-2013 which is higher than caesarean section rate recommended by WHO (10%-15%) [17]. WHO study which was conducted in eight Latin American countries in 2005 reported caesarean section rate as 33%, also in another study by WHO in nine Asian countries during the years 2007-2008, this rate was reported as 27.3 % [16].

In general, the results of the study showed that postpartum maternal morbidity in Sanandaj was 101.8 per 1,000 deliveries. However, in international studies this rate has been reported from 3.8 to 430 per 1,000 deliveries [18].

The most important finding of this study was a positive relationship between mode of delivery and maternal outcomes. While in previous studies maternal morbidity of caesarean section deliveries had been reported as higher than vaginal delivery, but in this study, complications such as bleeding, perineal laceration, rupture of the cervix, hospitalization in ICU in vaginal delivery +episiotomy were greater than caesarean section [16-19]. In this study the risk of postpartum hemorrhage in vaginal + episiotomy delivery was greater than caesarean delivery. This finding is inconsistent with the results of Liu S et al., that reported increase of bleeding after caesarean section [15]. Although this result was unexpected because the average amount of hemorrhage in caesarean section is greater than vaginal delivery, this finding may indicate the importance of care and attention related to the mode of delivery. In caesarean section, more care and faster diagnosis and intervention is required to prevent bleeding which could potentially put the mother's life at risk [18]. International Confederation of Midwives and International Federation of Obstetrics and Gynaecology recommend active management of third stage of the delivery for all women with the aim of decreasing post partum bleeding and its related conditions [20].

In this study, risk of perineal laceration after vaginal delivery + episiotomy was greater than vaginal delivery. Several studies have shown that complications of routine use of episiotomy are one of the factors of perineal trauma and recommended limited use of episiotomy [21-23]. In a clinical trial conducted by Dannecker C et al., two ways of episiotomy were studied. In the first group, 49 cases were included in the study who underwent episiotomy because of fetal indications and 60 other cases were included in the second group who underwent episiotomy only in case of impending rupture. Episiotomy rate in the first and second groups were 41% and 77% respectively. Researchers concluded that chance of having a safe perineum in women with limited use of episiotomy (second group) was more and they had mild perineal trauma and less pain after delivery [24].

Findings of this study showed greater rate of cervical rupture during vaginal delivery + episiotomy than caesarean section, these findings were consistent with the results of other studies [22,23]. Landy HJ et al., demonstrated that risk factors among multiparous women regardless of parity for cervical lacerations included young maternal age, vacuum vaginal delivery, oxytocin use and cerclage [25]. Although in our study causes of cervical laceration were not investigated, the cervical laceration of this study could be due to use of oxytocin and augmentation, using operative vaginal delivery as well as episiotomy (36.99%). Therefore, complications of vaginal delivery could be reduced by reducing unnecessary interventions such as routine use of oxytocin and episiotomy.

In the present study the use of antibiotics in caesarean section delivery was three times higher than vaginal delivery (vaginal, vaginal + episiotomy, instrumental delivery). These findings are consistent with the results of other studies [22, 23, 26, 27].

In general, postpartum infection is the most common complication of caesarean delivery and this infection is associated with the length of labor, rupture of membranes and diabetes [24].

This study showed that the rate of mothers' hospitalization in ICU after vaginal delivery + episiotomy was greater than that of caesarean delivery which was inconsistent with the results of other studies [22-24]. In a study by Souza JP et al., the length of stay in the ICU after caesarean delivery has been more than what was found in vaginal delivery [27]. Also Lumbiganon P et al., concluded that, the risk of ICU stay after caesarean delivery was significantly higher than vaginal delivery [16].

The present study was comprehensive and conducted on maternal morbidity rate in Sanandaj and assessed prospectively all the deliveries during one year. Also, the large sample size was a strength of the study. A potential limitation of this study is that maternal outcomes were considered only after delivery until discharge from the hospital, while there may be some complications after discharge leading to readmission to the hospital (especially after vaginal delivery which is followed by an earlier discharge from the hospital). In addition, study hospitals were training, non training and private hospitals with different routines of care and procedures. This could affect the outcomes of delivery; however, in this study they were not investigated independently.

CONCLUSION

The finding of this study showed that caesarean section delivery rate in Sanandaj was 42.80% in 2012-2013 which is higher than caesarean section rate recommended by WHO. Also, this Study showed that there is a relationship between mode of delivery and maternal outcomes.

ACKNOWLEDGEMENTS

This article is the result of a research project approved by Kurdistan University of Medical Sciences. Researchers would like to appreciate Deputy of Research of Kurdistan University of Medical Sciences, midwives, and all other colleagues who took part in this study.

REFERENCES

[1] Mossadegrad A, Malekiha Z. Caesarean rate and factors in teaching hospitals of Esfahan. Scientific Medical Journal of Military Organization of Islamic Republic 2008;23:161-69.
[2] International conference on population and development (ICPD); 24 November 2004. No. prev. doc. http://www.unfpa.org/publications/international-conference-population-and-development-programme-action. Retrieved 20/4/2015.
[3] Health Ministry. Sima Report. Health of Islamic Republic of Iran. 2002; page 49
[4] McCourt C, Weaver J, Statham H, Beake S, Gamble J, Creedy DK. Elective caesarean section and decision making: a critical review of the literature. Birth 2007;34:65-79.
[5] Bryanton J, Gagnon AJ, Johnston C, Hatem M. Predictors of women's perceptions of the childbirth experience. Journal Obstetrics & Gynecology Neonatal Nursing. 2008;37:24-34.
[6] Turner CE, Young JM, Solomon MJ, Ludlow J, Benness C, Phipps H. Vaginal delivery compared with elective caesarean section: the views of pregnant women and clinicians. British Journal Obstetrics & Gynecology. 2008;115(12):1494-502.
[7] Hantoushzadeh S, Rajabzadeh A, Saadati A, Mahdanian A, Ashrafinia N, Khazardoost S, et al. Caesarean or normal vaginal delivery: overview of physicians' self-preference and suggestion to patients. Archive Gynecology & Obstetrics. 2009;280:33-37.
[8] Torloni M R, Daher S, Betrán A P, Widmer M, Montilla P, Souza J P, et al . Portrayal of caesarean section in Brazilian women's magazines: a 20-year review. Brit Med J. 2011;342(276):1-7.
[9] Allameh Z. The frequency of caesarean section in rural and urban areas of Iran. Journal of Research in Medical Sciences. 2000;5:27-31.
[10] Althabe F, Sosa C, Belizan JM, Gibbons L, Jacquerrioz F, Bergel E. Caesarean section rates and maternal and neonatal mortality in low-, medium-, and high-income countries: an ecological study. Birth. 2006;33(4):270-77.
[11] Pallasmaa N, Ekblad U, Gissler M. Severe maternal morbidity and the mode of delivery. Acta Obstetrics Gynecology Scandinavia. 2008;87(6):662-68.
[12] Lydon-Rochelle M, Holt VL, Easterling TR, Martin DP. First-birth caesarean and placental abruption or previa at second birth. Obstet Gynecol. 2001;97:765–69.
[13] Smith GC, Pell JP, Dobbie R. Caesarean section and risk of unexplained stillbirth in subsequent pregnancy. Lancet 2003;362:1779–84.
[14] Allen VM, O'Connell CM, Liston RM, Baskett TF. Maternal morbidity associated with caesarean delivery without labor compared with spontaneous onset of labor at term. Obstet Gynecol. 2003;102(3):477–82.
[15] Liu S, Heaman M, Joseph KS, Liston RM, Huang L, Sauve R, et al. Risk of maternal postpartum readmission associated with mode of delivery. Obstet Gynecol. 2005;105:836–42.

[16] Lumbiganon P, Loopaiboon M, Gulmezoglu AM, Souza JP, Taneepanichskul S, Ruyan P, et al. Method of delivery and pregnancy outcomes in Asia: the WHO global survey on maternal and perinatal health 2007-2008. Lancet. 2010; 375:490-99.
[17] Villar J, Valladares E, Wojdyla D, Zavaleta N, Carroli G, Velazco A, et al. Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. Lancet. 2006;367:1819-29.
[18] Roberts CL, Ford JB, Algert CS, Bell JC, Simpson JM, Morris JM. Trends in adverse maternal outcomes during childbirth: a population-based study of severe maternal morbidity. Pregnancy and Childbirth. 2009;9:7.
[19] Deneux- Tharaux C, Carmona E, Bouvier-Colle MH, Breart G. Postpartum maternal mortality and caesarean delivery. Obstetrics & Gynecology. 2006;108 (3):541-48.
[20] International Confederation of Midwives and International Federation of Gynecologists and Obstetricians: International Joint Policy Statement: Management of the third stage of labor to prevent postpartum hemorrhage. J Obstet Gynecol Can. 2003;25(11):952-53.
[21] Angioli R, Gomez- Marin O, Cantuaria G, Osullivan MJ. Severe perineal lacerations during vaginal delivery: The University of Miami experience. AM J Obstet Gynecol 2000;182 (5):1083-85.
[22] Eason E, Labrecque M, Wells G, Feldman P. Preventing perineal trauma during childbirth: a systematic review. Obstet Gynecol. 2000;95(3):464-71.
[23] American Collegue of Obstetrician and Gynecologists (ACOG). Episiotomy. Washington (DC): American College of Obstetricians and Gynecologists;2006 apr6p.(ACOG Practice Bulletin no. 71).
[24] Dannecker C, Hillemanns P, Strauss A, Hasbargen U, Hepp H, Anthuber C. Episiotomy and preneal tears presumed to be imminent: randomized controlled trial. Acta Obstet Gynecol Scand. 2005;84(1):65-71.
[25] Landy HJ, Laughon SK, Bailit J, Kominiarek MA, Gonzalez-Quintero VH, Ramirez M, et al. Characteristics associated with severe perineal and cervical lacerations during vaginal delivery. Obstet Gynecol. 2011;117(3):627-35.
[26] Melamed N, Ben-Haroush A, Chen R, Kaplan B, Yogev Y. Intrapartum cervical lacerations: characteristics, risk factors and effects on subsequent pregnancies. Am J Obstet Gynecol. 2009;200(4):388-94.
[27] Souza JP, Gulmezoglu AM, Lumbiganon P, Laopaiboon M, Garroli G, Fawole B, et al. Caesarean section without medical indications is associated with an increased risk of adverse short-term maternal outcomes: the 2004-2008 WHO global survey on maternal and perinatal health. BMC Medicine. 2010;8:71.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Obstetrics and Gynecology, School of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran.
2. Assistant Professor, Department of Obstetrics and Gynecology, School of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran.
3. Associate Professor, Department of Midwifery, School of Nursing and Midwifery, Kurdistan University of Medical Sciences, Sanandaj, Iran.
4. Associate Professor, Social Determinants of Health Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Roonak Shahoei,
Associate Professor, Department of Midwifery, School of Nursing and Midwifery, Kurdistan University of Medical Sciences, Sanandaj-66177-13446, Iran.
E-mail: rshaho@yahoo.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Oct 18, 2016**
Date of Peer Review: **Jan 12, 2017**
Date of Acceptance: **May 24, 2017**
Date of Publishing: **Jul 01, 2017**