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Immediate Maternal and Neonatal Outcomes of Forceps and Vacuum-assisted Deliveries at Rajavithi Hospital

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ABSTRACT

Objective: To compare the immediate maternal and neonatal outcomes of forceps and vacuum-assisted deliveries at Rajavithi Hospital.

Materials and Methods: A historical cohort study was used to analyze the immediate maternal and neonatal outcomes of forceps and vacuum assisted deliveries at Rajavithi Hospital between January 1, 1999 and December 31, 2006. The database of this study contains information of 1,177 mothers. Among 1,177 operative vaginal deliveries, there are 804 cases of forceps extraction and 373 cases of vacuum extraction. Simple random sampling by computer method was used to randomize both groups equally. Maternal outcomes, such as the usage of episiotomy and degree of lacerations, were compared and analyzed. Neonatal outcomes such as Apgar score, neonatal intensive care unit admissions, and cephalhematoma were also analyzed.

Results: The third and fourth degree perineal tear and postpartum hemorrhage were statistically significant more frequent in the forceps extraction than in the vacuum extraction. The cephalhematoma was statistically significant more frequent in the vacuum extraction than in the forceps extraction.

Conclusion: Vacuum extraction causes less maternal perineal tear but increases the risk of neonatal cephalhematoma than forceps extraction.

Keywords: forceps extraction, vacuum extractions, maternal outcomes, neonatal outcomes

Introduction

Within the past eight years, the numbers of deliveries by forceps extraction and vacuum extraction at Rajavithi Hospital have been declining continuously from 5.48% in the year 2000 to 2.36% in the year 2006 for vacuum extraction and from 2.41% to 1.99% for forceps extraction.[1] This event may happen from the concern of maternal and neonatal complications from delivery by vacuum or forceps extraction which were reported by Kovavisarach et al in 1994.[2] This trend is also found in other hospital such as Siriraj Hospital in which has been declining continuously from 5% in the year 1980 to 3% in the year 2006 while forceps extraction has been declining from 2-3% to 0.5% for forceps extraction.[3] Among these operative obstetrics, vacuum extraction was used more frequently than forceps extraction because

performing forceps extraction required more skill to apply blades and more precision to determine the fetal position. Moreover, there is the believe that forceps extraction may cause more complications than vacuum extraction, therefore the aim of this study is to compare the immediate maternal and neonatal outcomes of forceps extraction by more recent informations than the previous report.

Materials and Methods

The medical records of all forceps and vacuum-assisted deliveries that occurred from January 1, 1999, to December 31, 2006, at Rajavithi Hospital were reviewed. There are 804 cases of forceps extraction and 373 cases of vacuum extraction. Two hundred cases from each groups were randomized selected by computer method. The sample size was calculated using the rate of vacuum and forceps extraction from study of Kovavisarach, et al at Rajavithi Hospital.[2] Maternal outcomes, such as degree of lacerations, postpartum hemorrhage, and blood transfusion were compared. Neonatal outcomes such as Apgar scores, neonatal intensive care unit (NICU) admissions, cephalhematoma, subconjunctival hemorrhage, shoulder dystocia, brachial plexus injury were compared. The exclusion criteria were dead fetus in utero, failed vacuum or forceps extraction.

Immediate postpartum referred to 4 hours after delivery because neonates were observed 4 hours then transferred to mothers. If neonatal complications were observed, they would be transferred to Queen Sirikit National Inistitute of Child Health.

The instruments used were Simpson forceps (SCHREIBER GERMANY) and the modified Malmstorm vacuum extractor with diameter of 50 mm. and 40 mm.

The data was analyzed by using Chi-square test (X^2), Fisher's extract test (number less than 5 in each cell), Student's t-test, arithmetic means and standard deviation. $p<0.05$ was considered statistically significant. All data was collected and analyzed by using the computer program SPSS/PC and EpiInfo.

Results

Of 400 operative vaginal deliveries, 200 were forceps and 200 were vacuum assisted deliveries.

In Table 1, ages, parity, gestational age at delivery were not statistically different between both groups. Epidural block was used in forceps extraction significantly more common than vacuum. Prophylaxis, fetal distress, pregnancy induced hypertension and heart disease were indications used significantly more common in forceps extraction than vacuum extraction. Maternal exhaustion and moderate to thick meconium staining amniotic fluid were indications used significantly more frequent in vacuum extraction than forceps extraction.

Table 2 shows level of obstetrician. OB-GYN staffs significantly used vacuum extraction more common than forceps extraction. Second and third year residents used forceps extraction significantly more common than vacuum extraction but there was no difference in first year resident.

Third and fourth degree of perineal tear and postpartum hemorrhage were observed more in forceps extraction than in vacuum extraction significantly. No blood transfusion was observed in both groups.

Table 3 shows neonatal outcomes. No statistically significant difference in Apgar scores at 1 minute, birth weight, endotracheal intubation, transfer to NICU, mortality in both groups. Cephalhematoma was found more in vacuum extraction than in forceps extraction significantly. No shoulder dystocia and brachial plexus injury were observed in this study.

Table 1. Demographic data in the study groups

Demographic data	Forceps extraction n=200	Vacuum extraction n=200	p-value
Age (years)(mean±SD)	26.2 ± 6.0	28.1 ± 6.0	0.13
Parity (mean±SD)	0.4 ± 0.7	0.3 ± 0.5	0.34
Gestational age at delivery (weeks)	38.4 ± 2.1	38.9 ± 1.4	0.12
Epidural block (%)	7	2	0.016*
Indications (%)			
Prophylaxis	39	24.5	0.002*
Prolonged 2nd stage of labor	14.5	14.5	1.00
Fetal distress	30.5	16.0	0.001*
Persistent occiput posterior position	1	2.5	0.25
Deep transverse arrest of head	0	0.5	0.32
PIH	11	2.5	0.002*
Heart disease	11	0	< 0.05*
Maternal exhaustion	15	37.5	< 0.05*
Moderate to thick meconium staining amnionic fluid	1	10	< 0.05*

* Statistically significant PIH= pregnancy induced hypertension

Table 2. Level of obstetricians

Level of obstetricians (%)	Forceps extraction n=200	Vacuum extraction n=200	p-value
OB – GYN staffs	15.5	41	< 0.05*
3rd year residents	41	29.5	0.016*
2nd year residents	37	26	0.018*
1st year residents	6.5	3.5	0.17

* Statistically significant

Table 3. Maternal outcomes

Maternal outcomes (%)	Forceps extraction n=200	Vacuum extraction n=200	p-value
Tear			
3rd degree of perineal tear	15.5	1.5	< 0.05*
4th degree of perineal tear	6.5	1.5	0.011*
Postpartum hemorrhage	6	1.5	0.018*

* Statistically significant

Table 4. Neonatal outcomes

Neonatal outcomes (%)	Forceps extraction n=200	Vacuum extraction n=200	p-value
At 1 minute			
Apgar scores < 7	7.5	6.5	0.70
At 5 minute			
Apgar scores < 7	4.5	3	0.43
Cephalhematoma	0	15	< 0.05*
Subconjunctival hemorrhage	0.5	0	0.32
Endotracheal intubation	5.5	3	0.22
Transfer to NICU	5.5	2	0.22
Mortality	0	0.5	0.32
Birthweight (gram)(mean±SD)	3,018.8 ± 494.4	3,091.3± 381.7	0.10

* Statistically significant

Discussion

The demographic data about maternal age, parity, gestational age at delivery were not statistically significant difference between both groups. It suggested that this historical cohort study had a reliable method of randomization.

Epidural block was used more common in forceps extraction because the patients will have no sensation of bearing down, so many doctors preferred to use forceps extraction. Prophylaxis was an indication used more in forceps extraction because many doctors preferred to use this method. In patients with heart disease or hypertension, most doctor tried to abstain the patients from bearing down. In patients with fetal distress, most doctors prefer to use forceps extraction due to promptness of delivery. In indication that needed not promptness of delivery such as maternal exhaustion, most doctors preferred to use vacuum extraction.

Third and fourth degree perineal tear were found more common in forceps extraction. This finding corresponded to previous study of Johnson, et al,[4] Kovavisarach, et al[2] and Bofill, et al.[5] The reasons why postpartum hemorrhage was common in forceps extraction were not exactly known because the causes of postpartum hemorrhage were not completely recorded.

Second and third year residents performed forceps extraction more than vacuum extraction because in difficult or complicated cases that needed forceps extraction, second and third year residents were consulted by first year residents and these senior residents needed to practice these skill.[3] Performing vacuum extraction more than forceps extraction by OB-GYN staff may be due to their personal preferences. Cephalhematoma was the only neonatal complication that was more common in vacuum extraction because vacuum extraction had direct trauma to scalp. This finding was similar to previous studies of Johanson, et al,[4] Bofill, et al,[5] and Wen et al.[6] Other neonatal outcomes such as subconjunctival hemorrhage, endotracheal intubation, transfer to NICU, and mortality shows no statistically significant different between both groups and this finding was similar to the study of Mustafa, et al.[7]

The limitation of this historical retrospective study is some important data may be lost from incomplete record. Moreover, many confounding factors may have effect on maternal and neonatal outcomes. Prospective and multivariable logistic regression analysis are needed to confirm the

differences of maternal and neonatal outcomes between forceps extraction and vacuum extraction.

Conclusion: Vacuum extraction causes less maternal perineal tear but increases the risk of neonatal cephalhematoma than forceps extraction

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ผลลัพธ์ของมารดาและทารกแรกเกิดทันทีหลังคลอดโดยการใช้คีมและเครื่องดูดสุญญากาศช่วยคลอดที่โรงพยาบาลราชวิถี

หยิงฉี หวัง, อภิธาน พวงศรีเจริญ

วัตถุประสงค์ *: เพื่อเปรียบเทียบผลลัพธ์ของมารดาและทารกแรกเกิดทันทีหลังคลอดโดยการใช้คีมและเครื่องดูดสุญญากาศช่วยคลอดที่โรงพยาบาลราชวิถี*

วัสดุและวิธีการ *: ศึกษาวิจัยแบบ historical cohort เพื่อเปรียบเทียบผลลัพธ์ของมารดาและทารกแรกคลอดโดยการใช้คีมและเครื่องดูดสุญญากาศช่วยคลอด ที่โรงพยาบาลราชวิถีระหว่างวันที่ 1 มกราคม พ.ศ. 2542 ถึง 31 ธันวาคม พ.ศ. 2549 มีมารดา 1,177 รายที่ช่วยคลอดโดยคีม 804 ราย และช่วยคลอดด้วยเครื่องดูดสูญญากาศ 373 ราย ใช้วิธีการสุ่มแบบ simple random ด้วยเครื่องคอมพิวเตอร์ออกมา 2 กลุ่มเท่า ๆ กัน นำผลลัพธ์การคลอดของมารดา เช่น การตัดฝีเย็บและความรุนแรงของการฉีกขาดของฝีเย็บมาทำการเปรียบเทียบและวิเคราะห์ นำผลลัพธ์ของทารกแรกเกิด เช่น Apgar score การส่งรักษาตัวต่อที่หน่วยการดูแลทารกแรกเกิด ระยะวิกฤต และ cephalhematoma มาทำทางการวิเคราะห์*

ผลการศึกษา *: พบการฉีกขาดของช่องทางคลอดระดับที่ 3 และ 4 และการตกเลือดหลังคลอดในการใช้คีมช่วยคลอดมากกว่าการใช้เครื่องดูดสุญญากาศช่วยคลอดอย่างมีนัยสำคัญทางสถิติ พบ cephalhematoma ในการใช้เครื่องดูดสุญญากาศช่วยคลอดมากกว่าคีมช่วยคลอดอย่างมีนัยสำคัญทางสถิติ*

สรุป *: การช่วยคลอดด้วยเครื่องดูดสุญญากาศมีการบาดเจ็บต่อการฉีกขาดของช่องทางคลอดของมารดาน้อยกว่า แต่มีการเกิด cephalhematoma มากกว่าการช่วยคลอดด้วยคีม*