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Original Research Article

Instrumental delivery: a comparative study in a tertiary care hospital

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ABSTRACT

Background: To compare maternal and neonatal outcomes of vacuum versus forceps application in assisted vaginal delivery.

Methods: Women in labor with vertex presentation were delivered by indicated/prophylactic vacuum or forceps. A total of 500 cases were included in this retrospective study. Maternal and neonatal morbidity were compared in terms of perineal lacerations, episiotomy extension, post-partum hemorrhage, Apgar score, neonatal jaundice, perinatal mortality, NICU admissions etc. Chi square test was used to analyze the data.

Results: Maternal morbidity was significant in the forceps group. With regards to neonatal morbidity, in NICU admissions, statistically significant difference was noted.

Conclusions: Vacuum and forceps should remain appropriate tools in the modern obstetrics. However, ventouse may be chosen first (if there is no fetal distress) as it is significantly less likely to injure the mother and decrease NICU admissions.

Keywords: Instrumental deliveries, Forceps, Ventouse

INTRODUCTION

In certain conditions normal, for various reasons, assisted vaginal delivery is the method of choice. Vaginal delivery being assisted by instruments can either be of vacuum extraction or forceps, a choice based on obstetrician's competence and training.¹ As the rate of cesarean deliveries increased over the past 2 decades, the rate of operative vaginal delivery decreased from 9% of all deliveries in 1992 to 3.3% in 2013 in United States.² Hence there is a need to relook and encourage operative vaginal deliveries.

James Young Simson was the first to use traction to deliver a baby. It was later modified by Malmstrom in 1953. The obstetric forceps has its history from the time of Chamberlain family in the seventh century. Vacuum extraction has recently gained in popularity because of new designs of vacuum cups, thereby minimizing injury to infants.³ However, a meta-analysis of randomized trials

comparing maternal and infant outcomes between vacuum extraction and forceps deliveries have found that vacuum extraction causes less maternal trauma.⁴

This study has been carried out in our tertiary center to evaluate the maternal and neonatal morbidity, failure and complications associated with these two methods and to decide which is safer and more effective.

METHODS

A retrospective study was carried out in our tertiary care institution over a period of 2 years from January 2015 to December 2016. 500 consecutive cases of forceps delivery or ventouse extraction were included in this study.

The various indications for instrumental delivery were fetal distress, non-progressive second stage of labor, cut short second stage of labor, poor maternal efforts.

Written and informed consent was taken. Cases were scrutinized for demographic data, gestational age, birth weight and indication for instrumental delivery. Exclusion criteria from both the groups were cases of multiple pregnancy, preterm (< 34 wks of gestation) and breech presentation. Institutional ethical committee approval was taken. The instruments used for vacuum extraction were silastic 40mm and 60mm cups. The negative pressure applied was up to 0.6kg/cm.

The forceps used was Wrigley's outlet forceps. Neonatal outcomes of interest were birth weight, Apgar score, NICU admission, cephalhematoma and scalp injuries. Maternal outcomes of interest were genital tract injuries like vaginal wall tear, cervical tear, vulvo-vaginal hematoma and 3rd and 4th degree perineal tears and postpartum hemorrhage. Condition of mother and baby at the time of discharge was noted. Data was entered and analyzed using Microsoft Excel and the results were expressed as proportions. Chi square test and student t test were applied to find out the significance of association and p value and p value <0.05 was considered as statistically significant.

RESULTS

Out of the 500 cases of instrumental deliveries, vacuum was more preferred than forceps in our institution accounting for 71% of instrumental deliveries (Table 1).

Table 1: Instrumental deliveries.

Instrument delivery	%
Forceps delivery (%)	143 (28.6)
Vacuum extraction (%)	357 (71.4)

Table 2: Characteristics of the study group.

Maternal characteristics	Forceps (143)	Vacuum (357)
Mean age in years	23.1 (3.2)	22.9 (3.3)
Mean gestational age in weeks	38.2	38.6
Nulliparity (%)	116 (81%)	232 (65%)
Primiparity (%)	23 (16.2%)	99 (27.7%)
Multiparity (%)	4 (2.8%)	26 (7.3%)

Maternal age and gestational age in both the groups were comparable.

The majority of the instrumental deliveries in both the groups were in nulliparous women. (Table 2).

In our study 12% of study group was constituted by teenage pregnancies, 16 women of 18 years and 44 women of 19 years.

Prolonged second stage of labor was the most common indication for forceps deliveries and meconium stained amniotic fluid was the commonest indication among

vacuum deliveries. To cut short the second stage of labor (indication 5,6,7and 8) forceps was used in 8.4% and vacuum was used in 23% of the total cases. Other indications were failure of maternal powers and fetal distress.

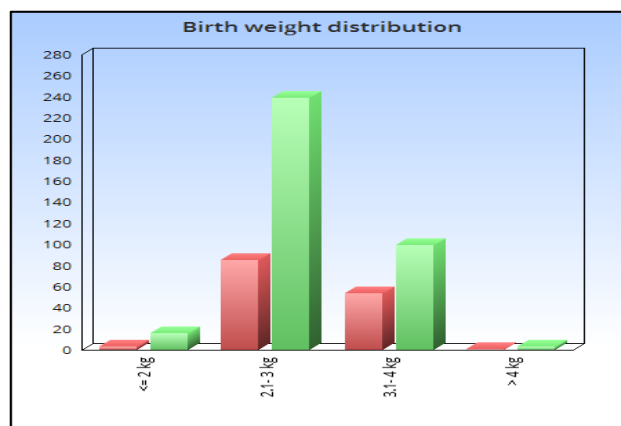
Table 3: Indications for instrumental delivery.

Indication for instrumental delivery	Forceps Total-143	Vacuum Total-357
Prolonged second stage	34 (23.8%)	62 (17.4%)
Failure of maternal powers	24 (16.8%)	67 (18.8%)
Fetal distress	24 (16.8%)	31 (8.7%)
Meconium stained amniotic fluid	19 (13.3%)	82 (23%)
Eclampsia/preeclampsia	21 (14.7%)	65 (18.2%)
Vaginal birth after caesarean delivery	18 (12.6%)	24 (6.7%)
Anaemia	1 (0.7%)	16 (4.5%)
Cardiac disease	2 (1.4%)	10 (2.8%)

Table 4: Birth weight.

Characteristics	Forceps mean (SD)	Vacuum mean (SD)
Birth weight (kg)	2.94 (0.389)	2.85 (0.432)

Mean birth weight was 2.94 kg in forceps group and 2.85 kg in vacuum group and the difference was statistically significant. (P value 0.027 by students independent t test). Mean birth weight in our study was 2.88 kg.



Pink- forceps, green- vacuum

Figure 1: Birthweight distribution.

Majority of the babies were in the birth weight group of 2.1 to 3 kg. 38.4% of the babies in the forceps group were > 3 kg and it was 28.5 % in vacuum group.

Table 5 shows that maternal morbidity such as cervical tear, paraurethral tears, vaginal tears and perineal tears were observed more frequently after forceps application. The difference in the incidence of significant maternal trauma was statistically significant.

Table 5: Maternal morbidity.

Maternal morbidity	Forceps (%)	Vacuum (%)
Episiotomy extension	42 (29.3)	86 (24)
Vaginal wall tear	53 (37)	26 (7.2)
Paraurethral tear	15 (10.4)	23 (6.4)
3 rd degree perineal tear	10 (6.9)	6 (1.7)
Complete perineal tear	6 (4.2)	1 (0.2)
Cervical tear	14 (9.7)	8 (2.2)
Haematoma	2 (1.3)	4 (1.1)
*Significant maternal trauma- 4,5,6,7	32 (22%)	19 (5%)

*Statistically significant because P value < 0.05

Table 6 shows the neonatal morbidity in the 2 groups. There was no significant difference between the 2 groups in neonatal morbidity except in NICU admissions.

Table 6: Neonatal morbidity.

Neonatal morbidity	Forceps	Vacuum
Neonatal jaundice	29	50
Cephalhaematoma	2	4
Convulsions	7	9
Brachial plexus injury	1	1
Perinatal mortality	7	7
NICU admissions*	51	88

* NICU admissions were higher in forceps group with statistical significance since P value is < 0.05.

DISCUSSION

Although deliveries by vacuum extraction and forceps are certainly not a substitute for caesarean delivery, they are safe obstetric practices with many benefits when protocols are followed and can be accomplished more quickly than cesarean delivery.

The mean age of women in our study was 23 years. The two groups did not vary significantly with respect to age and parity.

Mean birth weight in present study was 2.88 kg. Majority of the babies were in the birthweight group of 2.1- 3 kgs. According to a study the use of instruments is more frequent in infants with higher birth weight and gestational age.⁵ But the babies with higher birth weights (>4 kg) were only 4 in this study as they were preferentially taken for elective cesarean.

Table 6 shows that maternal morbidity was significantly less in ventouse group as compared to forceps group which is in accordance with the results of Cochrane Database.⁶ In present study maternal morbidity such as cervical tear, paraurethral tears, vaginal tears and perineal tears were observed more frequently after forceps application.

In a review of randomized trials comparing forceps deliveries with vacuum deliveries authors found that, forceps were more likely to be associated with third and fourth degree perineal tears (RR, 1.89; 95% CI, 1.51-2.37) with no difference in the occurrence of cephalhematoma (RR, 0.64; 95% CI, 0.37-1.11).⁷

In this study there was no statistically significant difference in neonatal morbidity except in NICU admissions. Neonatal morbidity differs substantially among various published reports.⁸⁻¹¹ In a review of 13 randomized trials comparing forceps with vacuum extraction no significant differences were found in umbilical pH, severe morbidity or neonatal death.⁷

Long term maternal and neonatal outcomes were also not studied in the study.

CONCLUSION

Our study analyzed maternal and fetal outcomes in instrumental deliveries. Our study opines that ventouse application is associated with significantly less maternal trauma than with forceps. There seems to be no difference in neonatal outcome. The major factor which determines the safety of the instrument is the operator rather than the instrument. Skill of the operator with an appropriate level of expertise and good judgment ensures better outcomes. Encouraging operative vaginal deliveries may help to reduce the unwarranted and raised caesarean section rates. The art of instrumental delivery using either vacuum or forceps should be taught to the residents. Also, those who have learnt its usage, but are not using it any longer, should undergo training workshops to update themselves so as to reach the WHO recommendation of a 10-15% caesarean section rate set to achieve optimal maternal and perinatal safety.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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