

## COMPARATIVE STUDY OF EARLY FETOMATERNAL OUTCOME BETWEEN VENTOUSE AND OUTLET FORCEPS IN INSTRUMENTAL VAGINAL DELIVERY

Manorama Kumari<sup>1</sup>, Deepshikha<sup>2</sup>, Lata Shukla Dwivedy<sup>3</sup>

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Corresponding Author:  
Dr. Deepshikha,  
Email: deepshikhkr71@gmail.com.

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<sup>1</sup>Senior Resident, Department of Obstetrics and Gynaecology, ANMMCH, Gaya, Bihar, India.

<sup>2</sup>Senior Resident, Department of Obstetrics and Gynaecology, ANMMCH, Gaya, Bihar, India.

<sup>3</sup>Professor, Department of Obstetrics and Gynaecology, ANMMCH, Gaya, Bihar, India.

### Abstract

**Background:** With this background the present study has been carried out to evaluate the maternal and neonatal morbidity, failure and complications associated with these two instruments for assisted vaginal deliveries, at tertiary health care centre in the region of Bihar State. **Materials and Methods:** A total of 150 cases of instrumental deliveries were taken in this retrospective study. It is carried out at ANMMCH, Gaya, and Bihar. Seventy Five (75) consecutive cases of vacuum assisted delivery and seventy Five (75) consecutive cases of forceps assisted delivery were scrutinized for demographic data, various indications for instrumental delivery, parity, gestational age, maternal morbidity and neonatal outcomes. Exclusion criteria from both the groups were cases of multiple pregnancy, preterm (<34 wks of gestation) and breech presentation (for forceps in after coming head). Institutional Ethical Committee approval was taken. The instruments used for vacuum extraction were sialistic 40mm and 60 mm cups. The negative pressure applied was up to 0.6 kg/cm<sup>2</sup>. Forceps deliveries were performed using short curved outlet Wrigley's forceps. Statistical analyses in this study were conducted using Statistical Package for Social Sciences 16.0 (SPSS Inc.; Chicago, IL, USA) program. **Results:** A total caesarean rate in our hospital in the study period was 42.3%, and primary caesarean rate was 16.3%. A total of 150 cases of instrumental deliveries were taken in this retrospective study. It is carried out at ANMMCH, Gaya, and Bihar from December 2023 To January 2024. Seventy Five (75) consecutive cases of vacuum assisted delivery and seventy Five (75) consecutive cases of forceps assisted delivery. Seventy five point nine percent of the forceps deliveries, and 58.5% of the vacuum deliveries were nulliparous. Hematocrit values of gestational week and before and after delivery were not different statistically. **Conclusion:** Our study concluded that ventouse application is associated with significantly less maternal trauma than with forceps.

## INTRODUCTION

Vacuum extraction and forceps are the two options when an instrument is needed to facilitate a vaginal birth. The choice between these two options has usually been based on tradition and training.<sup>[1]</sup> In North America, forceps has been used more frequently than vacuum extraction whereas reverse is true in Europe and Asia.<sup>[2-4]</sup> Vacuum extraction has recently gained in popularity because of new designs of vacuum cups with reduced risk of injury to the neonate.<sup>[5]</sup> James Young Simpson was the first to use traction to deliver a baby in 1849. It was later modified by Malmstrom in 1953. The obstetric forceps had its history from the time of Chamberlain

family in the seventh century. Modern obstetric practice has witnessed an increased caesarean rate worldwide. Assisted vaginal delivery, with the use of forceps and vacuum extraction, offers the option to accomplish safe delivery for the mother and clinician. It avoids caesarean section and its associated morbidity and implications for future pregnancy. Forceps and vacuum have been compared in many studies.<sup>[6-9]</sup> Review of the literature suggests different maternal and neonatal outcomes and complications rates between the two methods. Both are associated with increased risk of maternal and neonatal injury when compared to normal spontaneous vaginal deliveries. Poor maternal and neonatal outcome has also been

reported after the sequential use of vacuum and forceps for assisted vaginal delivery.<sup>[10,11]</sup> Furthermore; it has been repeatedly shown that maternal injury is less frequent and less extensive with the use of vacuum. With this background the present study has been carried out to evaluate the maternal and neonatal morbidity, failure and complications associated with these two instruments for assisted vaginal deliveries, at tertiary health care centre in the region of Bihar State.

## MATERIALS AND METHODS

A total of 150 cases of instrumental deliveries were taken in this retrospective study. It is carried out at ANMMCH, Gaya, Bihar. Seventy Five (75) consecutive cases of vacuum assisted delivery and seventy Five (75) consecutive cases of forceps assisted delivery were scrutinized for demographic data, various indications for instrumental delivery, parity, gestational age, maternal morbidity and neonatal outcomes. Exclusion criteria from both the groups were cases of multiple pregnancy, preterm (<34 wks of gestation) and breech presentation (for forceps in after coming head). Institutional Ethical Committee approval was taken. The instruments used for vacuum extraction were sialistic 40mm and 60 mm cups. The negative pressure applied was up to 0.6 kg/cm<sup>2</sup>. Forceps deliveries were performed using short curved outlet Wrigley's forceps. Maternal morbidity was analyzed in terms of perineal, vaginal and cervical lacerations, episiotomy extensions, urinary and faecal incontinence and traumatic post partum hemorrhage. Neonatal complications in both groups included low Apgar score at birth, unexplained convulsions, jaundice, facial and scalp injuries, cephalhaematoma, birth asphyxia, neonatal sepsis and NICU admissions. They all are compared in both groups. Condition of mother and neonate at the time of discharge was noted.  $\chi^2$  (Chi Square) test was used to analyze the data and p value <0.05 was considered as statistically significant.

### Statistical Analysis

Statistical analyses in this study were conducted using Statistical Package for Social Sciences 16.0 (SPSS Inc.; Chicago, IL, USA) program. For evaluation of data in addition to descriptive methods (mean, standard deviation), independent t-test was used for comparison of paired groups, and chi-squared test was used for comparison of qualitative data. The results were evaluated at the significance level of p<0.05.

## RESULTS

A total caesarean rate in our hospital in the study period was 42.3%, and primary caesarean rate was 16.3%. A total of 150 cases of instrumental deliveries were taken in this retrospective study. It is carried out at ANMMCH, Gaya, and Bihar from December 2023 To January 2024. Seventy Five (75) consecutive cases of vacuum assisted delivery and seventy Five (75) consecutive cases of forceps assisted delivery were scrutinized for demographic data, various indications for instrumental delivery, parity, gestational age, maternal morbidity and neonatal outcomes. The two groups were compared in terms of demographic data, indications, and maternal and neonatal results.

Seventy five point nine percent of the forceps deliveries, and 58.5% of the vacuum deliveries were nulliparous. Hematocrit values of gestational week and before and after delivery were not different statistically.

The most common indication in the forceps group was the extension of the second stage. The most common indication in the vacuum group was foetal distress, and it was significantly higher compared to the forceps group. The indications of maternal heart disease and maternal fatigue were not different between the two groups (Table 1)

Episiotomy, postpartum transfusion, vaginal lacerations, postpartum haemorrhage, cervical tears, sphincter injuries, and postpartum hysterectomy data were evaluated as maternal results. Although episiotomy, vaginal lacerations, postpartum haemorrhage, and cervical tears were higher in the forceps group, we detected that it was not statistically significant. We detected that although sphincter injury, postpartum transfusion, and postpartum hysterectomy were not statistically significant, they were more frequent in the vacuum group compared to the forceps group (Table 2). We conducted power analysis between the two groups according to maternal complications, and we detected it as 94.65%.

Foetal blood pH values, rates of hospitalization in the neonatal intensive care unit, cephalhaematoma, and injury of brachial plexus, neonatal jaundice, and the 1st and 5th minute Apgar scores were evaluated. Foetal blood pH values were significantly lower in the Vacuum group. We observed the rates of hospitalization in the neonatal intensive care unit, and injuries of brachial plexus were more frequent in the forceps group, however it was statistically significant. Although the rates of cephalhaematoma, neonatal jaundice, the 1st minute Apgar<5 and 5th minute Apgar<7 were not statistically significant in the vacuum group, they were higher

**Table 1: Demographic data**

	Forceps (n=75)	Vacuum (n=75)	p
Gestation week	36.81 +_ 1.32	39.85+_1.21	0.960
Age	24.00+_ 6.41	25.65+_6.66	0.874
Hematocrit before delivery	36.77+_ 4.34	39.73+_3.76	0.457

<b>Hematocrit after delivery</b>	34.2+ 2.45	34.21+-3.65	0.270
<b>Nulliparity</b>	49 (%75.33)	26 (%58.5)	0.112

**Table 2: Indication**

	<b>Forceps (n=75)</b>	<b>Vacuum (n=75)</b>	<b>p</b>
Extension of the 2nd stage	27(36%)	19( 25.33% )	0.74
Foetal distress	16(21.2)	30( 40% )	0.001
Maternal heart disease	8(10.66)	10( 1.33% )	0.847
Maternal fatigue	24(32%)	16(21.33 )	0.081

## DISCUSSION

Birth rates by caesarean in the recent years have risen throughout the world.<sup>[12]</sup> Operative vaginal deliveries are important for decreasing birth rates by caesarean and related morbidities.<sup>[1]</sup> The rates of operative vaginal deliveries vary from country to country and even from centre to centre. While operative vaginal delivery rate reported in the developed countries is 10%–15%, it is 1%–3% in the developing countries.<sup>[13,14]</sup> The operative vaginal delivery rate in our study is 1.2%. The reasons for such a low rate are medico legal problems, loss of operative vaginal delivery doctrines in years, and the birth rates by caesarean.<sup>[15,16]</sup> Vacuum and forceps are two instruments used in operative vaginal deliveries. The choice of instrument depends on the preference and experience of the obstetrician. In the recent years, while the use of forceps has decreased, the use of vacuum has increased. The reasons for this are randomized studies indicating that maternal trauma is higher in delivery by forceps compared to delivery by vacuum and the developments in the vacuum equipment.<sup>[17]</sup> Various studies indicate that operative vaginal deliveries are more common in nulliparous parturient. The reason for this is that the second stage of delivery is longer, and maternal fatigue is more frequent in prim gravid women.<sup>[18,19]</sup> In our study, 79.0% of forceps deliveries and 58.8% of vacuum deliveries took place in nulliparous parturient. Indications for operative vaginal delivery are foetal distress, maternal heart disease, extension of the second stage, and maternal fatigue. In our study, we have displayed that the instrument of choice in foetal distress cases in our hospital is vacuum. The difference between the groups in terms of other indications is not statistically significant. In different studies, the preference in foetal distress cases is in the direction of vacuum. The studies showing that forceps is preferred more often in foetal distress cases have reported that they have preferred forceps since it can be applied faster than vacuum.<sup>[20-22]</sup> Opening episiotomy in operative vaginal deliveries depends on the preference of the obstetrician. In our study, routine episiotomy application was not performed both in the vacuum and forceps groups; however, episiotomy was applied more often in the forceps group than in the vacuum group. The reason for this is to prevent maternal complications due to studies indicating that maternal injury is higher in forceps applications. In some studies, routine

episiotomy was performed in forceps applications. The Cochrane database has displayed that maternal morbidity is less in the vacuum group than in the forceps group. It has been displayed that the anaesthesia requirement in vacuum application and the pain during and after delivery are reduced.<sup>[10,23,24]</sup> There are studies indicating that anal sphincter injuries are more frequently seen in forceps deliveries; however, no significant difference was seen in our study. It was indicated in the randomized controlled study conducted by Eason et al,<sup>[25]</sup> that the relative risk of sphincter damage in forceps application increased 4.7 times compared to vacuum application.

In our study, no difference was observed between the two groups in terms of maternal complications such as perineal and cervical lacerations. Neonatal morbidity has been reported at different rates in the literature. It was indicated in the Cochrane review consisting of nine controlled randomized studies that vacuum did not lead to low Apgar scores compared to forceps.<sup>[10]</sup> In our study, foetal blood pH was found to be significantly low in the vacuum group. The reason is that, in our study, deliveries with the foetal distress indication in the vacuum group were higher. There are many studies that indicate that cephalhaematoma and neonatal jaundice are observed more often in the vacuum group. There are literature data reporting that low Apgar scores, hospitalization in neonatal intensive care unit, and instrument scars are more often seen in the forceps group.<sup>[26,27]</sup> In our study, we observed that the rates of hospitalization in neonatal intensive care unit and injuries of brachial plexus from neonatal complications were more common in the forceps group; however, we did not detect it as statistically significant. Although the rates of cephalhaematoma, neonatal jaundice, and the 1st minute Apgar<5 and the 5th minute Apgar<7 in the vacuum group were not statistically significant, they were higher.

## CONCLUSION

Instrumental vaginal delivery by experienced health care provider is associated with good obstetric outcomes with minimal risk. Our study concluded that ventouse application is associated with significantly less maternal trauma than with forceps. Neonatal outcomes were similar in both types of instrumental deliveries. The safety of the instrument is dependent mainly on

operator's skills and right judgment regarding case selection. Improved training of residents in instrumental delivery may help to reduce the unwarranted and raised caesarean section rates.

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