

A Comparative Study of Immediate Fetomaternal Outcome between Outlet Forceps and Ventouse in Instrumental Vaginal Delivery

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Abstract: ***Objective:** Instrumental vaginal delivery is used to ease out normal vaginal birth where cesarean section can be avoided. **Methods:** In here a comparative study was performed between two groups were in one case instrumental vaginal delivery was performed with outlet forceps and the other with ventouse. **Results:** A comparison of neonatal and maternal morbidity was analyzed using various parameters among the groups. Instrumental delivery is found to be used more in case of nulliparous woman and there is no significant difference ($p= 0.457$) observed between forceps and ventouse. **Conclusion:** In conclusion there was no significant difference observed in case of neonatal morbidity but in case of maternal morbidity there was more incidences of extension of episiotomy involving anal sphincter in forceps delivery.*

Keywords: vaginal delivery, cesarian section, outlet forceps, ventouse, neonatal, maternal

1. Introduction

Instrumental vaginal delivery is normal vaginal birth assisted by obstetric forceps or ventouse suction cup which helps to ease out the labor. Almost 3.6% of vaginal delivery is carried out in this way and if considered the ratio between suction cup and forceps it's 4:1¹. The introduction of instrumental vaginal delivery is to accelerate delivery with minimum maternal or neonatal morbidity. even though in some cases it results in harmful outcomes for either mother or baby or both². Even though cesarean exist as an option lot of complications are there associated with cesarean delivery for both mother and baby^{7,9}. Among low and middle income country settings caesarean section is mostly unavailable or less readily resorted. High maternal morbidity and mortality from caesarean section and the risk of scarred uterus in future pregnancies are also factors of concern¹². Instrumental vaginal delivery is mainly used during obstructed second stage of labour and presumed fetal compromise. Instrumental vaginal delivery rate is also inversely proportional to the caesarean section rate and is a clear need in in low income nations^{13,14}.

But it is also seen that even though instrumental vaginal delivery is better there are disadvantages as well. Major effects observed are trauma to the vagina, perineum, lower urinary tract and anorectal area. This may cause severe postpartum hemorrhage and varying degrees of perineal tears increasing the maternal mortality and morbidity following child birth. These complications may cause reduction in quality of life with respect to sexual problems, urinary

problems as well as anorectal dysfunction and complications like third and four degree episiotomy extension and vaginal lacerations (around 13%)³. Babies delivered by instrumental deliveries have been reported to have increased incidence of trauma the worst being intracranial, subdural, subgaleal hemorrhages, and cephalhematomas. Higher chances of birth asphyxia and neonatal jaundice are also observed in babies⁴.

However, most of the above complications occur following improper forceps and ventouse delivery. Usage of high forceps and mid forceps or ventouse in case of poor cervix dilation or high up station is not preferred but instead cesarean section is performed. In order to reduce above complications only the outlets of the instruments are used currently.

In North America forceps delivery is generally used more frequently, whereas the reverse is observed in Europe⁶. Due to advance in design of vacuum cups that helps in minimizing injury to infants has gained in popularity¹⁰. When comparative study was done between vacuum extraction and forceps deliveries it was found that vacuum extraction causes less maternal trauma¹¹. Another advantage is that instrumental vaginal deliveries also reduce the incidence of caesarean section and thereby implications of uterine scar in future pregnancies⁸. An understanding of anatomy of birth canal and fetal head is prerequisite has also made ventouse and outlet forceps safe for usage. It is strongly recommended that obstetrician achieve experience in spontaneous delivery prior to commencing instrumental delivery.

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In this study our endeavor was to analyse instrumental deliveries which may improve fetomaternal outcome if used appropriately and in safe hands. This study was therefore designed to compare immediate fetomaternal outcome between outlet forceps and ventouse in instrumental vaginal delivery.

2. Material and Methods

Study Area

Eden Hospital, Department of Obstetrics and Gynecology, Medical College and Hospital Kolkata.

Study Population

Consisted of primigravida or multigravida at >37wks of gestational age admitted in labor room in labor awaiting vaginal delivery

Inclusion Criteria

Mothers having

- Fetus in vertex presentation
- Dilatation of cervix by up to 10 cm
- Reassuring fetal testing
- Following indications for instrumental delivery: Prolonged second stage of labor (>2hours in primigravida or >1 hr. in multigravida.), to cut short the second stage of labor like cardiac diseases, hypertension, etc. and maternal exhaustion.

Conditions to be fulfilled before application of forceps and ventouse:

- Scalp is visible at the introitus without separating the labia.
- Fetal skull has reached the level of pelvic floor.
- Sagittal suture is in direct anteroposterior diameter or in right or left occiput anterior or posterior position.
- Fetal head is at or on the perineum.
- Rotation is less than or equal to 45°.

Exclusion Criteria

Failure to fulfill all requirement for operative vaginal delivery-

- Incomplete dilatation of cervix
- Intact fetal membrane
- Unengaged vertex

Abnormalities of labor-

- Fetal malpresentation- breech, brow, face, transverse
- Suspected cephalopelvic disproportion
- Failure to obtain informed consent from patient

Estimated gestational age <37 weeks

- 3 Underlying fetal disorder-
- Fetal bleeding disease 30
- Fetal distress

Prerequisites for operative

Maternal Criteria

- Adequate analgesia
- Patient in lithotomy position
- Bladder empty

- 4. Clinical pelvimetry must be adequate in dimension and size to facilitate an atraumatic delivery
- Verbal or written consent obtained

Fetal Criteria

- Vertex presentation
- The fetal head must be engaged in pelvis
- The position of the fetal head must be known with certainty
- The station of fetal head must be > +2
- The estimated fetal weight must be documented ideally 2.5 to 4.5 Kg
- The attitude of fetal head and the presence of caput succedaneum and moulding should be noted.

Uteroplacental Criteria

- Cervix fully dilated
- Membranes ruptured
- No placenta praevia

Other Criteria

- An experienced operator who is fully acquainted with the use of instruments.
- Ability to monitor fetal well being
- The capability to perform an emergency caesarean delivery if required 31.

Sample Size

We have taken total 80 samples and have divided them in two groups each containing 40 patients. Considering the proportion of extension of episiotomy wound in ventouse and forceps groups as 13.3% and 40%(taking reference from earlier study) a sample size of 40 was calculated in each group with a Type I error of 0.05 and Type II error of 0.02(using Statistical software MedCalc).

Study Period: January 2015- July 2016

Sample Design

Total 80 patients who were divided in two groups. In one group we have applied ventouse according to random table number and in the other group we have applied outlet forceps. Patients who have fulfilled inclusion and exclusion criteria were recruited into two study groups with the help of predesigned computerized random number table. Prospective randomised controlled trial interventional open label parallel study.

Study Tools

1. Study protocol
2. Case record form
3. Informed consent form
4. Random number table
5. Main score

Study Technique

All the pregnant woman fulfilling inclusion and exclusion criteria were recruited randomly into two groups. After obtaining written informed consent pregnant woman were delivered by using either ventouse or forceps applications in respective groups. Immediately neonatal and maternal morbidity was assessed and patients were followed up till

recovery. We have assessed main score within 24 hrs of birth and then on 7th day after birth. Maternal and neonatal assessment was done within 24 hrs of delivery, and on 7 th day after delivery and also at the time of discharge.

Application and Technique

Vacuum delivery and outlet forceps delivery was performed by the standard method³⁰. For vacuum delivery we have used metal suction cup of 4 cm diameter. And by the help of mediseal vacuum delivery system we have delivered the baby by the pressure upto 750 cm2.

Data Analysis

Data was presented in mean±SD and number (%).Statistical analysis was done by applying appropriate statistical method with the help of standard statistical software. Microsoft Excel, SPSS, Medcalc.etc.

Statistical Methods

Categorical variables are expressed as Number of patients and percentage of patients and compared across the groups using Pearson’s Chi Square test for Independence of Attributes.

Continuous variables are expressed as Mean ± Standard Deviation and compared across the 2 groups using unpaired t test.

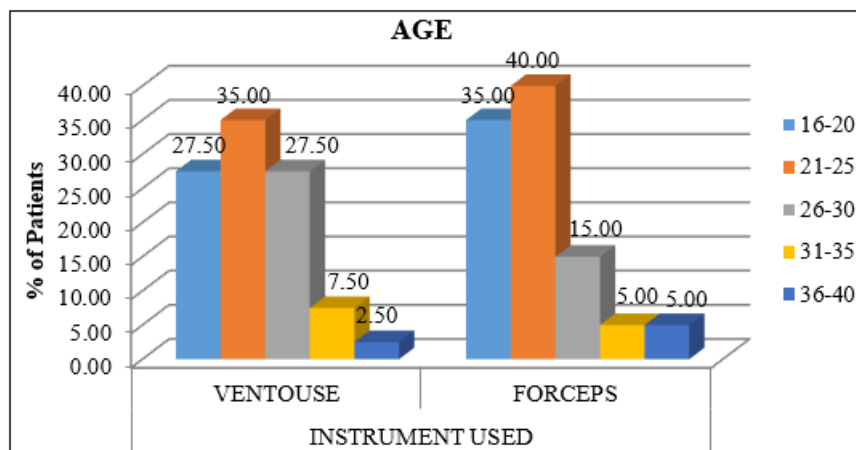
The statistical software SPSS version 20 has been used for the analysis.

An alpha level of 5% has been taken, i.e. if any p value is less than 0.05 it has been considered as significant.

3. Results

Age distribution in instrumental vaginal delivery

The study was carried out for a period of July 2014- Jan 2016 among two groups, each consisting of 40 pregnant woman randomly selected. The age group distribution in each group was analysed and the data is as shown in Graph 1. There is no significant difference (p=0.645) between both the groups and the mean age was found to be 24.8 ± 5.36 in case of ventouse and 23.48 ± 4.95 in case of forceps.

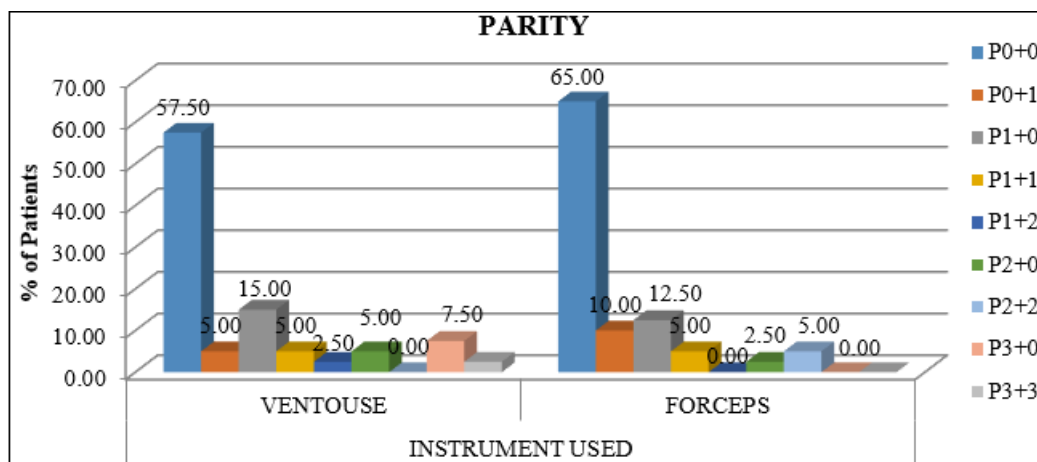


Graph 1: Distribution of age of woman among ventouse and forceps

Parity as a parameter for choosing delivery procedure

The study proceeded to see how parity of woman decides the type of delivery. As shown in Graph 2 the instrumental

delivery is found to be used more in case of nulliparous woman and there is no significant difference (p= 0.457) observed between forceps and ventouse.



Graph 2: Percentage of woman with different parity that used instrumental vaginal delivery

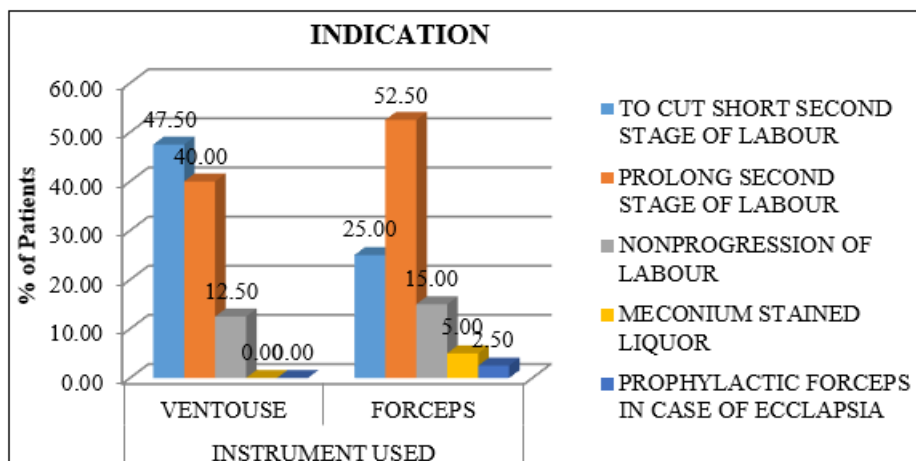
So, it gives an idea that support in delivery is mostly utilized by woman who is undergoing delivery the first time. When the period of gestation was considered there was no

significant difference observed (p=0.261) and was showing an average period of 38 weeks.

Indication on usage of instrument at various stages of labor

Data was collected to find at which stage of labor assistance was required for delivery. Most common indications were to

cut short the second stage of labor in 36.25% of cases (pregnancy induced hypertension, heart disease, previous one cesarean section in labor) and prolong second stage of labor in 46.25% of cases as shown in Graph 3.



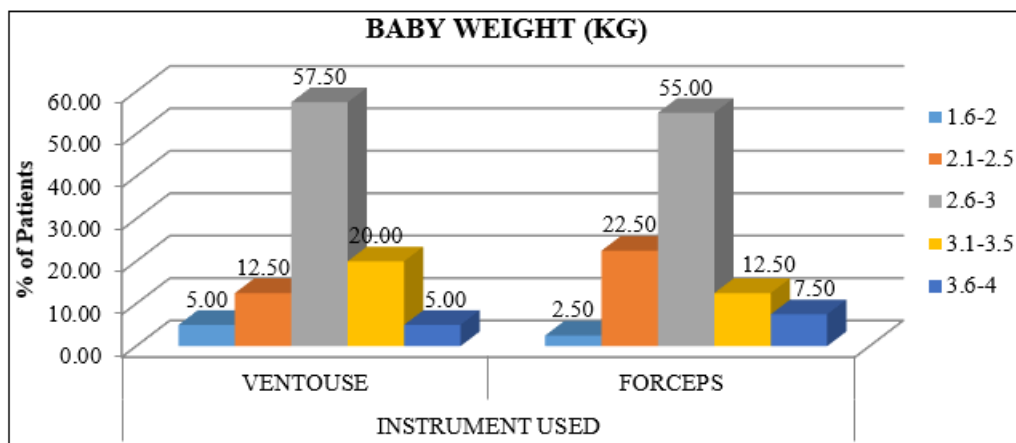
Graph 3: Indication on use of instrumental vaginal delivery on different stages of labor

Effect of baby weight in instrumental vaginal delivery

The weight of the baby plays a role in delivery. A study was carried out by keeping weight of the infant as a parameter. It was observed as seen in Graph 4 for babies weighing 2.6-3 Kg instrumental delivery was used and here also no significant difference is observed among the instruments. It is evident that in both ventouse and forceps delivery mean of baby weight is 2.78 and 2.79 which is almost similar with p value 0.928.

Morbidity of neonates during instrumental vaginal delivery

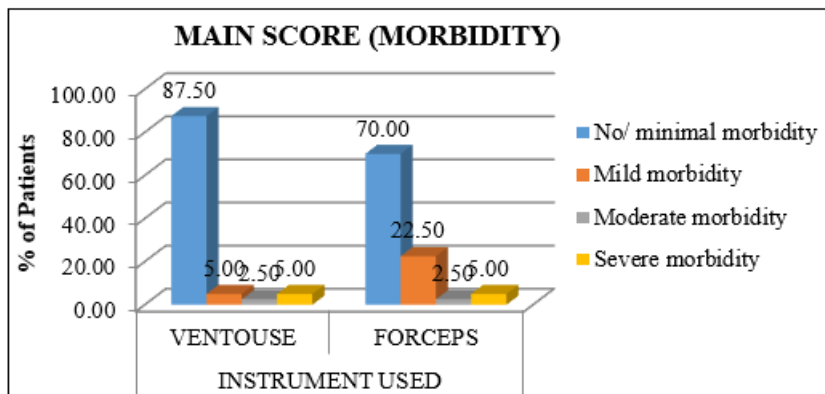
An investigation for carried out to see how safe is it for the neonates to use instruments for delivery. It was observed that 87.5% of the neonates didn't show any morbidity when delivered using ventouse and 70 % in case of forceps. From the Graph 5 it is also evident that only 5% severe morbidity is observed in both types of instrumental delivery with an average main score of 90.38 for ventouse and 140.18 for forceps respectively.



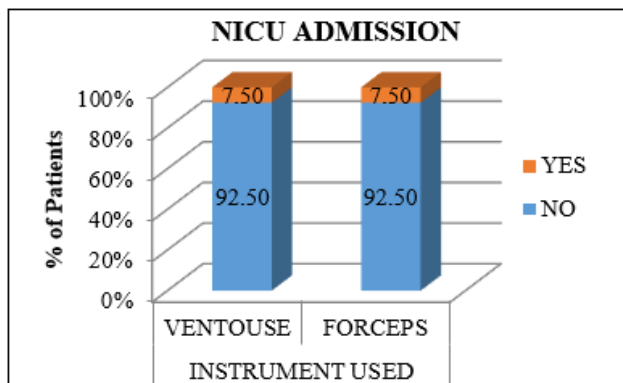
Graph 4: Relation of baby weight and instrumental vaginal delivery

NICU Admission is also a parameter for assessment of fetal outcome. It can be seen that only 7.5% was admitted to NICU due to complications associated with that developed due to

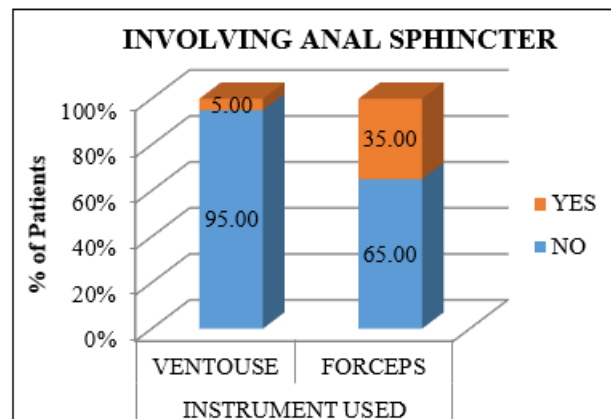
usage of forceps or ventouse as shown in Graph 6. So in overall the risk associated is very less for neonates born with instrument assisted delivery.



Graph 5: Morbidity assessment in neonates by main score in instrumental vaginal delivery



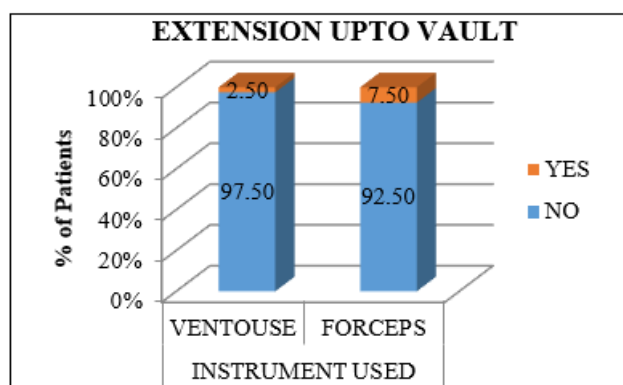
Graph 6: Percentage of NICU admissions associated with instrumental vaginal delivery



Graph 8: Episiotomy involving anal sphincter

Requirement of episiotomy after instrumental vaginal delivery

During difficult delivery episiotomy is performed up to vault and is an extra effort to be made by pregnant woman. It was seen that in cases where assistance from instruments was used this could be avoided. For both the techniques ventouse as well as forceps above 95% cases could avoid this procedure as presented in Graph 7,8. It also gives a conclusion that one method is not outstanding than the other ($p=0.305$).

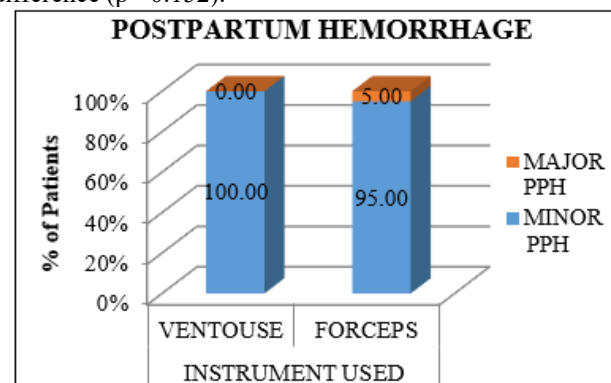


Graph 7: Episiotomy extension up to vault in instrumental vaginal delivery

In some cases episiotomy is performed up to a cut involving anal mucosa or anal sphincter. When data was collected considering this parameter it showed a significant difference ($p=0.001$) between ventouse and forceps system. Only 5% of the cases were found to undergo this process in case of forceps whereas for delivery performed using ventouse almost 35% of the cases were found to undergo the procedure as shown in Fig. 8.

Postpartum hemorrhage condition after instrumental vaginal delivery

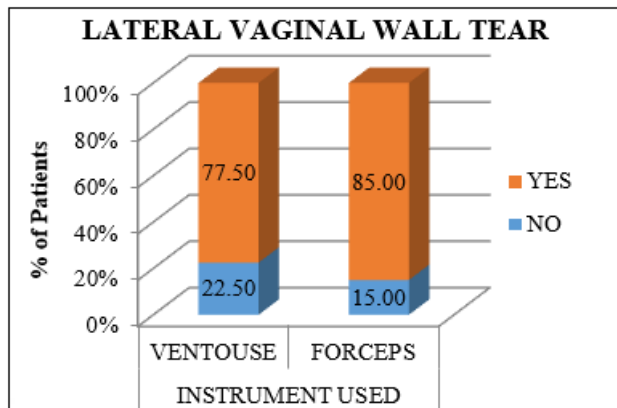
Postpartum hemorrhage is an after effect in most of the complicated delivery cases. A study was carried out to find if instrumental vaginal delivery leads to this condition. It was found that the blood loss is less than 1 liter in both the techniques and in 95% of the cases there was no requirement of blood transfusion from Graph 9. It can also be seen that both the techniques are safe as there is no significant difference ($p=0.152$).



Graph 9: Postpartum hemorrhage in instrumental vaginal delivery

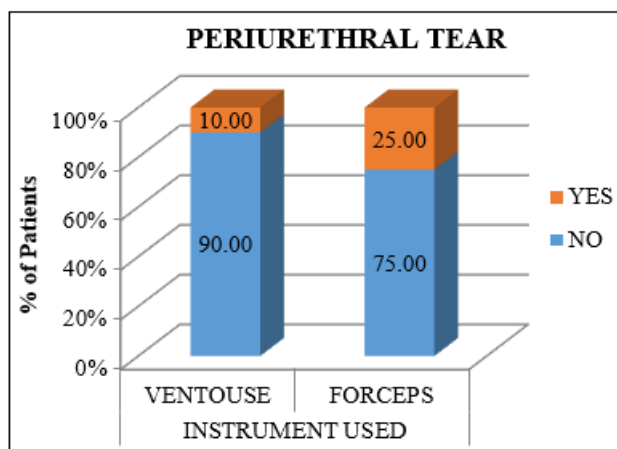
Damage to vaginal wall during instrumental vaginal delivery

Another side effect after vaginal delivery is vaginal tear. It can go from anterior, lateral to posterior tear and can even extend up to periurethra. When investigated in case of lateral vaginal tear it can be seen that for both the cases above 75% of the cases did undergo through lateral vaginal tear as shown in Graph 10. Here also the difference between the groups is insignificant ($p=0.390$).



Graph 10: Lateral vaginal tear in instrumental vaginal delivery

In case of periurethral tear only 25% cases were found in forceps and 10% in case of ventouse as evident from Graph 11. In here as well comparison between groups shows that it is insignificant statistically with p value= 0.077.



Graph 11: Periurethral tear in instrumental vaginal delivery

4. Discussion

Instrumental vaginal delivery is a procedure that is gaining attention. The vaginal delivery is performed with the assistance of instruments and most common ones used are outlet forceps and ventouse. A comparative study of instrumental vaginal delivery using forceps and ventouse has been done to check how much safe the procedure is for the baby and the pregnant woman and which of the instruments is best.

In this study the mean age of the group who used and forceps was found to be 24.8 ± 5.36 for ventouse and 23.48 ± 4.95 for forceps respectively. In a similar study conducted by Abha Singh and Pratibha Rathod et al, it was found that the mean

age group 23.81 ± 3.6 yrs²⁴. The two groups did not vary significantly with respect to age and parity. This is comparable to a study conducted by Nazish Khalid et al, who found that parity among mothers undergoing instrumental delivery were majority were primigravidae (74% in both cases) with no significant difference²³. In another study it was found that vacuum is more useful in multigravida especially when dilatation is 8-9 cm. and rim is present¹⁹.

The indications for forceps and ventouse delivery were almost same with the most common indication being prolong second stage of labor and to cut short the second stage of labour which was not significant statistically ($p=0.161$). A similar conclusion is reported in a study, where the most common indication was found to cut short second stage of labor (pre-eclampsia, previous caesarean section, heart disease, anemia) followed by prolonged second stage of labor, fetal distress and maternal exhaustion²⁴.

The mean baby weight in forceps was 2.79 ± 0.41 and ventouse was 2.78 ± 0.4 which is almost similar and not found to be statistically significant (p value 0.664). When morbidity of neonates was taken as a parameter it was found that only 5% of the cases showed morbidity in both the groups and only 7.5% were admitted to NICU. This gives a conclusion that both the instruments have the same effect in overall. But in a study it has been reported that the rate of neonates with Apgar scores >5 at 1 min was significantly higher after forceps (18%) compared with vacuum delivery (5.2%). However, the rate of neonatal trauma did not differ significantly between the two groups²².

Maternal complications are of great concern during child birth. In cases where vaginal opening is not comfortable enough episiotomy is performed and the cut can extend up to vault up and some cases anal sphincter and anal mucosa also get involved. It can be seen that usage of instruments didn't help to avoid the procedure but it could also be seen that it didn't worsen the condition either. But in here also there was no significant difference observed in both the groups except in case of forceps usage there have been involvement of anal sphincter in episiotomy significantly more ($p=0.001$) than in case of ventouse. No anterior vaginal wall tear was seen in either groups. Posterior vaginal wall tear was seen in all patients in both ventouse and forceps delivery. In both the groups periurethral tear occurred but was statistically insignificant ($p=0.077$). Other than an increase in anal sphincter involvement in forceps delivery there is no significant difference between the two groups regarding injury to birth canal. A trial study showed that a decrease of 4.9 % was seen in anal sphincter injury when vacuum was used over forceps²¹.

Major postpartum hemorrhage was seen only in 2 women in case of forceps delivery which required blood transfusion and was nil in case of ventouse. But the cause for bleeding was malnourishment and not an injury caused by the use of forceps. However, this is in contrast to a study that reported blood loss of >500 ml was also more common in the forceps group (12%) than in the vacuum group (4.05%) with significant statistical difference. This is due to higher incidence of maternal birth canal injuries with forceps delivery²³.

5. Conclusion

In conclusion while comparing the two types of instrumental vaginal delivery there is no significant difference in neonatal morbidity. Regarding maternal morbidity there was more incidences of extension of episiotomy involving anal sphincter in forceps delivery. From the point of view of maternal morbidity, assisted vaginal delivery by vacuum extraction gives better results than by forceps. A larger study with bigger sample size is needed to reemphasize the findings.

Conflict of Interest

The author declares no conflict of interest, financial or otherwise.

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