International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622
**Indexing:** Embase
**Impact Factor (RJIF):** 6.71

www.gynaecologyjournal.com
2026; 10(1): 460-467
Received: 21-11-2025
Accepted: 25-12-2025

**Dr. Preeti Darda**
Associate Professor, Department of Obstetrics & Gynaecology, Terna Medical College & Hospital, Nerul, Navi Mumbai, Maharashtra, India

**Dr. Dipali Patil**
Associate Professor, Department of Obstetrics & Gynaecology, Terna Medical College & Hospital, Nerul, Navi Mumbai, Maharashtra, India

**Dr. Amit Agrawal**
Associate Professor & H.O.D, Department of Obstetrics & Gynaecology, Terna Medical College & Hospital, Nerul, Navi Mumbai, Maharashtra, India

**Corresponding Author:**
**Dr. Preeti Darda**
Associate Professor, Department of Obstetrics & Gynaecology, Terna Medical College & Hospital, Nerul, Navi Mumbai, Maharashtra, India

# Instrumental vaginal deliveries (Forceps and Ventouse) maternal & neonatal outcome

**Preeti Darda, Dipali Patil and Amit Agrawal**

**DOI:** https://www.doi.org/10.33545/gynae.2026.v10.i1f.1912

**Abstract**
Instrumental Vaginal Delivery (IVD) remains a vital obstetric intervention used to expedite birth in the second stage of labor when maternal or fetal indications arise. Despite advancements in obstetrics, the decision between forceps and vacuum extraction (ventouse) continues to be influenced by operator skill, fetal position, and safety considerations. This article reviews maternal and neonatal outcomes associated with forceps and vacuum-assisted deliveries, highlighting comparative benefits, risks, and clinical implications.

**Keywords:** Instrumental vaginal delivery (IVD), forceps, ventouse, maternal outcome, neonatal outcome

## Introduction
Although there is periodic and vocal demand to delete assisted vaginal delivery, clinical experience provides recurring evidence that leaving, all to nature or the scalpel will not accomplish any goals. As the aim of every maternity care in today's world is to optimize the health of the mother, the health of the baby and the emotional satisfaction of the family, the need for operative vaginal delivery cannot be overemphasized.

The second stage of labor is a dynamic event that may require assistance, when maternal efforts fail to effect delivery or when there are non-reassuring fetal heart tones. Therefore, knowing how to perform an operative vaginal delivery with forceps or vacuum is vital for providing maternal care. The World Health Organization considers operative vaginal delivery to be a critical part of basic emergency obstetric care [1].

Instrumental vaginal delivery is defined as delivery of a baby vaginally using an instrument for assistance [2]. Instrumental or assisted vaginal birth is commonly used to expedite birth for the benefit of either mother or baby or both. It is sometimes associated with significant complications for both mother and baby. The choice of instrument may be influenced by clinical circumstances, operator choice and availability of specific instruments [3].

A painless, less traumatic and healthy neonatal outcomes are the primary goals of any labor process. In routine 10% of all vaginal deliveries require instrumentation [4]. The choice available for instrumentation include use of outlet forceps and the vacuum extraction.

The use of vacuum extraction and forceps is frequently seen in our country. While the use of outlet forceps has been in clinical practice since decades, recently the trend shift is seen in the direction of vacuum mode of delivery [5].

The factors allowing the rapid acceptance of the later mode of instrumental delivery include lesser incidence of maternal trauma, minimal training requirements for using vacuum extractors and user friendliness [6]. However, the search on Medline and PubMed yields contrasting literature about the selection of appropriate method of instrumental delivery.

There are studies favoring the time tested outlet forceps to be better instrumental method but on the other hand there is some evidence which suggest its pitfalls [4]. The literature also include studies in which forceps delivery has been termed as better modality of operative vaginal delivery in terms of neonatal outcome. The earlier work focused on the maternal side of problems, including the increased frequency of maternal tears, soft tissue damages and post-delivery scarring resulting in the development of procedures like vacuum extraction [8]. However the vacuum extraction procedure is also being critically analyzed for its advantages and side effects [7].

Thus, amidst the continuing critical interest surrounding this ancient art, an attempt is being made to study the current status of instrumental vaginal delivery, and its maternal and neonatal outcome.

**Aims and Objectives**

- To study the incidence of instrumental vaginal deliveries as practiced for the common indications.
- To study the maternal outcome of instrumental vaginal deliveries.
- To evaluated the early neonatal outcome of instrumental vaginal deliveries.
- To compare the outcome of forceps and vacuum assisted deliveries.

**Materials and Methods**

This present prospective randomized comparative study was conducted among 100 pregnant women admitted in OBGY department of Terna medical college & Hospital, Mumbai. Study period was from August 2023 to August 2025 (2 years).

In this study, cases were chosen at random. 50 cases of vacuum extraction were compared with 50 cases of forceps delivery. Patients were selected as per inclusion and exclusion criteria and the maternal and fetal outcomes were compared.

100 Singleton term viable pregnancies with cephalic presentation admitted in the labor room of this Institute were included in the study. After admission in the labor ward, a thorough history taking and examination of patient was done.

**Inclusion Criteria**

- Singleton pregnancies.
- Cephalic presentation.
- Term gestation (≥ 37 weeks).

**Second stage of labor requiring intervention due to:-**

- Fetal distress.
- Maternal exhaustion.
- Prolonged second stage.
- Maternal comorbidities requiring shortening of the second stage (e.g., cardiac disease, PIH).
- Fully dilated cervix and ruptured membranes.
- Adequate maternal pelvis as per clinical assessment.

**Exclusion Criteria**

- Malpresentations (breech, face, brow).
- Preterm gestation (< 37 weeks).
- Multiple gestation.
- Suspected Cephalopelvic Disproportion (CPD).
- Unengaged head or high station.
- Known fetal congenital anomalies.
- Contraindications to instrumental delivery such as clotting disorders or incomplete dilatation.

**History:** A detailed history was taken with regard to amenorrhea, onset of labour pain, and any problems during pregnancy, whether the patients had regular ANC etc. The obstetric history was elicited as to whether the patients us a primigravida or Multigravida and her past obstetric history noted. The menstrual history with reference to LMP was taken and the period of gestation calculated. The patient was asked for any significant past and family history.

**Clinical Examination**

A detailed general examination was done following which a per abdominal examination was done to determine the height of uterus, the lie of fetus, position and presentation and fetal heart Rate.

A pelvic examination was done to determine the consistency, Effacement and dilation of cervix. Pelvic assessment was done to rule out contracted pelvis and cephalopelvic disproportion and relevant investigation sent. Women were recruited only after a written informed valid consent and the mode of attempted instrumental vaginal delivery was in accordance to the operator's analysis and judgment. Ethical Clearance was obtained from Institution ethical committee and informed written consent were taken from all patients.

**Statistical analysis**

After data collection, data entry was done on Excel. Data analysis is done with the help of SPSS software Ver 26.0. Quantitative data is presented with the help of Mean, Sd, Median and IOR, comparison among study groups is done with the help of Unpaired T test or Mann Whitney test as per results of Normality test. Qualitative data is presented with the help of Frequency and percentage table, association among study group is assessed with the help of Chi-Square Test. P value less than 0.05 is taken as significant level.

**Results**

This present prospective randomized comparative study was conducted among 100 pregnant women admitted in OBGY department of Terna medical college & Hospital, Mumbai. In present study, incidence of instrumental vaginal deliveries was 8.8%, of which 57.6% were forceps deliveries and 42.4% were vacuum deliveries (Table 1).

Majority of the patients in either group however were between the ages of 25-29 years i.e. 52% in Forceps Group and 47% in Vacuum Group (Table 2). Nulliparas constituted the bulk of the cases in both the study group (80%). Para 1 accounted for 18.0% & 14.0% respectively in the forceps and Vacuum Group. (Table 3) Maximum proportion of women were belonged to gestational age of 38.1 to39 wks., i.e. the Forceps Group (32%) & the Vacuum group (30%). 18% from forceps group & 21% from vacuum group were postdated (Table 4).

The indications for which the Forceps and Vacuum was applied for conduct of delivery are shown here. The majority of the cases were for fetal distress (62%) with 38 patients (76.0%) in the Forceps Group and 24 patients (48.0%) in the Vacuum Group. The next common indication was failure of 2° forces which constituted 13% of the study group. Forceps was more commonly used in case of fetal distress, than vacuum (76% versus 48%) while vacuum was more commonly used for failure of 2° forces than forceps (16% versus 10%) Both forceps and vacuum were used in other conditions to cut short the second stage of labour, so as to prevent undue stress and strain to the mother. In 10 patients of Forceps Group and in 11 patients in Vacuum Group the instruments were used to cut short the second stage of labour. The indications for this were Previous LSCS, Cardiac disease, Severe Preeclampsia, Anaemia, Eclampsia, Epilepsy and Prolonged second stage (Table 5).

The occipitoanterior position was the commonest in either of the group i.e. 80% in forceps group &78% in vacuum group. (Table 6) The average duration of second stage was 28.30 minutes in Forceps Group and 31.32minutes in the Vacuum Group. (Table7) The mean birth weight of baby in the Forceps Group was 2.82Kg. (Table 8) The success rate of instrumental vaginal delivery was 95%. It was 96% for forceps attempts and 94% for vacuum attempts (Table 9).

The total incidence of fetal morbidity in the current study was 25%. But it is important to note that none of them were major complications. There was one case of cephalhaematoma in the Vacuum Group and none in Forceps Group. Scalp injuries and abrasions were present in 7 babies (14%) in the Forceps Group and none of the babies in Vacuum Group had any injuries. The incidence of other complications like respiratory distress, neonatal jaundice and NICU admissions did not very much in both the groups, though neonatal jaundice was seen in 3 versus 2 babies in the Vacuum Group when compared to forceps. There was no mortality in either groups (Table 10).

The incidence of maternal morbidity in the current study was at about 34%. Maternal morbidity in the form of local perineal trauma was greater in forceps group as compared to vacuum group. Blood transfusion was required postnatally for 1 patient in the Vacuum Group. She was an anaemic patient with Hb% of 7.4 g% (Table 11).

**Table 1:** Incidence of Instrumental Vaginal Deliveries

| Mode of delivery | No. | % |
|---|---|---|
| Total deliveries | 1405 | 100 |
| Total instrumental vaginal deliveries | 125 | 8.8 |
| Total Forceps deliveries | 72 | 5.1 |
| Total Ventouse deliveries | 53 | 3.7 |
| Total normal deliveries | 739 | 52.59 |
| Total Caesarean sections | 523 | 37.22 |

**Table 2:** Distribution of study subjects according to age & type of deliveries.

| Age (yrs.) | Forceps | | Ventouse | | Total | |
|---|---|---|---|---|---|---|
| | N | Percent | N | Percent | N | Percent |
| 15 to 19 yrs. | 3 | 6.0% | 0 | 0.0% | 3 | 3.0% |
| 20 to 24 yrs. | 10 | 20.0% | 12 | 24.0% | 22 | 22.0% |
| 25 to 29 yrs. | 26 | 52.0% | 21 | 42.0% | 47 | 47.0% |
| 30 and above Yrs. | 11 | 22.0% | 17 | 34.0% | 28 | 28.0% |
| Total | 50 | 100.0% | 50 | 100.0% | 100 | 100.0% |
| Chi Square Value | 4.999 | | | | | |
| Significance 'P' Value | 0.172 (NS) | | | | | |

**Table 3:** Distribution of the sample by parity and groups

| Parity | Forceps | | Ventouse | | Total | |
|---|---|---|---|---|---|---|
| | N | Percent | N | Percent | N | Percent |
| 0 | 39 | 78.0% | 41 | 82.0% | 80 | 80.0% |
| 1 | 9 | 18.0% | 7 | 14.0% | 16 | 16.0% |
| 2 | 2 | 4.0% | 2 | 4.0% | 4 | 4.0% |
| Total | 50 | 100.0% | 50 | 100.0% | 100 | 100.0% |
| Chi Square Value | 0.300 | | | | | |
| Significance 'P' Value | 0.861(NS) | | | | | |

**Table 4:** Distribution of the sample by gestational age and groups

| Gestational age (GA) | Forceps | | Ventouse | | Total | |
|---|---|---|---|---|---|---|
| | N | Percent | N | Percent | N | Percent |
| Less than 38 Wks. | 11 | 22.0% | 13 | 26.0% | 24 | 24.0% |
| 38.1 to 39 Wks. | 16 | 32.0% | 14 | 28.0% | 30 | 30.0% |
| 39.1 to 40 Wks. | 14 | 28.0% | 11 | 22.0% | 25 | 25.0% |
| More than 40 Wks. | 9 | 18.0% | 12 | 24.0% | 21 | 21.0% |
| Total | 50 | 100.0% | 50 | 100.0% | 100 | 100.0% |
| Chi Square Value | 1.089 | | | | | |
| Significance 'P' Value | 0.780 (NS) | | | | | |

**Table 5:** Distribution of the sample by groups & indications

| Indication | | Instrument | | Total | Chi Square Value | P-Value |
|---|---|---|---|---|---|---|
| | | Forceps | Ventouse | | | |
| Cardiac | Count | 2 | 1 | 3 | 17.428 | 0.008 (S) |
| | Percent | 4.0% | 2.0% | 3.0% | | |
| Epilepsy | Count | 1 | 2 | 3 | | |
| | Percent | 2.0% | 4.0% | 3.0% | | |
| FD | Count | 38 | 24 | 62 | | |
| | Percent | 76.0% | 48.0% | 62.0% | | |
| M.E. | Count | 0 | 13 | 13 | | |
| | Percent | 0.0% | 26.0% | 13.0% | | |
| P2 | Count | 2 | 2 | 4 | | |
| | Percent | 4.0% | 4.0% | 4.0% | | |
| PIH | Count | 3 | 2 | 5 | | |
| | Percent | 6.0% | 4.0% | 5.0% | | |
| Pre LSCS | Count | 4 | 6 | 10 | | |
| | Percent | 8.0% | 12.0% | 10.0% | | |
| Total | Count | 50 | 50 | 100 | | |
| | Percent | 100.0% | 100.0% | 100.0% | | |

**Table 6:** Distribution of groups by position of head

| Position | Forceps | | Ventouse | | Total | |
|---|---|---|---|---|---|---|
| | N | Percent | N | Percent | N | Percent |
| LOA | 4 | 8.0% | 5 | 10.0% | 9 | 9.0% |
| LOT | 0 | 0.0% | 1 | 2.0% | 1 | 1.0% |
| OA | 40 | 80.0% | 39 | 78.0% | 79 | 79.0% |
| OP | 1 | 2.0% | 2 | 4.0% | 3 | 3.0% |
| ROA | 4 | 8.0% | 3 | 6.0% | 7 | 7.0% |
| ROT | 1 | 2.0% | 0 | 0.0% | 1 | 1.0% |
| Total | 50 | 100.0% | 50 | 100.0% | 100 | 100.0% |
| Chi Square Value | 2.600 | | | | | |
| Significance 'P' Value | 0.761(NS) | | | | | |

**Table 7:** Mean duration of Second stage of labour

| 2nd stage | N | Mean | Std. Dev | Median | IQR | Mann Whitney test | P-Value |
|---|---|---|---|---|---|---|---|
| Forceps | 50 | 28.30 | 13.55 | 30.00 | 25.00 | 0.680 | 0.497 |
| Ventouse | 50 | 31.32 | 18.70 | 30.00 | 20.00 | Difference is not significant | |

**Table 8:** Descriptive statistics of the sample for two groups for birth weight of baby

| Weight of Baby | N | Mean | Std. Dev | Median | IQR | Mann Whitney test | P-Value |
|---|---|---|---|---|---|---|---|
| Forceps | 50 | 2.82 | 0.33 | 2.77 | 0.50 | 2.101 | 0.036 |
| Ventouse | 50 | 2.94 | 0.33 | 2.95 | 0.55 | Difference is significant | |

**Table 9:** Distribution of groups by outcome of instrumental vaginal delivery

| Outcome | Forceps | | Ventouse | | Total | | Chi Square | |
|---|---|---|---|---|---|---|---|---|
| | N | Percent | N | Percent | N | Percent | | |
| Success | 48 | 96.00% | 47 | 94.00% | 95 | 95.00% | 0.211 | 0.646 (NS) |
| Failure | 2 | 4.00% | 3 | 6.00% | 5 | 5.00% | | |
| Total | 50 | 100.00% | 50 | 100.00% | 100 | 100.00% | | |

**Table 10:** Distribution of the Sample by Neonatal Outcome and Groups

| Neonatal outcome | | Instrument | | Total | Chi Square | P-Value |
|---|---|---|---|---|---|---|
| | | Forceps | Ventous | | | |
| Neonatal jaundice | Count | 2 | 3 | 5 | 10.320 | 0.243(NS) |
| | Percent | 4.0% | 6.0% | 5.0% | | |
| RDS | Count | 2 | 2 | 4 | | |
| | Percent | 4.0% | 4.0% | 4.0% | | |
| Facial palsy | Count | 1 | 0 | 1 | | |
| | Percent | 2.0% | 0.0% | 1.0% | | |
| Cephalhematoma | Count | 0 | 1 | 1 | | |
| | Percent | 0.0% | 2.0% | 1.0% | | |
| Abrasions | Count | 5 | 0 | 5 | | |
| | Percent | 10.0% | 0.0% | 5.0% | | |
| Scalp injury | Count | 2 | 0 | 2 | | |
| | Percent | 4.0% | 0.0% | 2.0% | | |
| Nicu-s | Count | 0 | 1 | 1 | | |
| | Percent | 0.0% | 2.0% | 1.0% | | |
| nicu-m | Count | 3 | 3 | 6 | | |
| | Percent | 6.0% | 6.0% | 6.0% | | |
| Normal | Count | 36 | 39 | 75 | | |
| | Percent | 72.0% | 78.0% | 75.0% | | |
| Total | Count | 50 | 50 | 100 | | |
| | Percent | 100.0% | 100.0% | 100.0% | | |

**Table 11:** Distribution of the sample by maternal outcome and groups

| Mat.outcm | | Instrument | | Total | Fisher's Exact Test | P-Value |
|---|---|---|---|---|---|---|
| | | Forceps | Ventous | | | |
| Extension of Episiotomy $ | Count | 4 | 2 | 6 | 11.410 | 0.001(HS) |
| | Percent | 8.00% | 4.00% | 6.00% | | |
| Vaginal laceration $ | Count | 5 | 2 | 7 | | |
| | Percent | 10.00% | 4.00% | 7.00% | | |
| Paraurethral tear $ | Count | 1 | 0 | 1 | | |
| | Percent | 2.00% | 0.00% | 1.00% | | |
| cervical tear $ | Count | 1 | 0 | 1 | | |
| | Percent | 2.00% | 0.00% | 1.00% | | |
| 1st & 2nd degree tear $ | Count | 5 | 3 | 8 | | |
| | Percent | 10.00% | 6.00% | 8.00% | | |
| 3rd & 4th degree tear $ | Count | 2 | 0 | 2 | | |
| | Percent | 4.00% | 0.00% | 2.00% | | |
| PPH $ | Count | 6 | 2 | 8 | | |
| | Percent | 12.00% | 4.00% | 8.00% | | |
| BT $ | Count | 1 | 0 | 1 | | |
| | Percent | 2.00% | 0.00% | 1.00% | | |
| Normal | Count | 25 | 41 | 66 | | |
| | Percent | 50.00% | 82.00% | 66.00% | | |
| Total | Count | 50 | 50 | 50 | | |
| | Percent | 100.00% | 100.00% | 100.00% | | |

## Discussion

Neonatal and maternal morbidity and the superiority of vacuum and forceps is a controversial topic. Many studies reviewed by the Cochrane database rev 2025 concluded that vacuum extractor appeared to reduce the maternal morbidity while there is a reduction in cephalhaematoma and retinal haemorrhages with Forceps. However the effect of Vacuum or Forceps when used exclusively in low or outlet setting is not highlighted by any of these studies

**Incidence of instrumental vaginal deliveries:** In the present study, there were total 125 instrumental vaginal deliveries, 72 being forceps applications and 53 being ventouse application. Incidence of forceps deliveries in the present study was 5.1% and that of vacuum deliveries was 3.7%.

| Author | Year | Incidence% |
|---|---|---|
| Cocrane review [8] | 2025 | 11 |
| Present Study | 2023-2025 | 8.8 |

**Mean age (years) of women with instrumental vaginal delivery:** Instrumental vaginal deliveries were significantly more common in the age group of 25-29 years 52% in Forceps Group and 47% in Vacuum Group. The mean age (in years) in forceps group was 26.3 and in vacuum group was27.28yrs. The age distribution in the present study matched that in all other studies.

| Author | Forceps | Vacuum |
|---|---|---|
| Johanson [9] (1993) | 25.7±5.0 | 26.1±5.0 |
| S,Achanna [10] (1994) | 21.2±4.7 | 22.4±5.5 |
| Prapas N [11] (2009) | 27±4.6 | 26±5. |
| Present Study (2023-2025) | 26.3 | 27.28 |

**Percentage of nulliparity in various studies:** Maximum (80%) instrumental deliveries were in nulliparous women, which was consistent with other studies. The incidence of instrumental vaginal deliveries was higher in nulliparous women probably because rigid perineum, minor degrees of relative cephalopelvic disproportion and uterine inertia posed special challenges during second stage of labor.

| Author | Forceps | Vacuum |
|---|---|---|
| Williams [12] (1991) | 78.4 | 85 |
| Aliya [13] (2008) | 58 | 61 |
| Johanson [9] (1993) | 78 | 82 |
| Present Study (2023-2025) | 78 | 82 |

**Indications of instrumental vaginal delivery**

In the present study, fetal distress was the most common indication of instrumental vaginal delivery (62%), more common in forceps group (76.0%) than in vacuum group (48.0%); Williams [12] *et al*. (1991) noted that 55% of forceps deliveries and 48% of vacuum assisted deliveries were for fetal distress, whereas Johanson [9] *et al*. quotes 53% of forceps and 56% vacuum attempts for fetal distress. In the present study instrumental delivery for maternal exhaustion occurred in 13 cases (26%) of vacuum deliveries and none in the forceps group, the results were comparable with other studies. Johanson [9] *et al*. reports a further lower incidence of 3.62% prophylactic instrumental vaginal delivery. In the present study prophylactic instrumental vaginal deliveries were reported in 21% cases. 11 instrumental deliveries were for severe pre-eclampsia, Eclampsia and 10 in cases of previous caesarean section. Prolonged second stage of labor comprised of 4% of instrumental vaginal deliveries. Prolonged second stage was associated with higher birth weights, only 23% were related with birth weight less than 2.5kg. Delay in second stage was reported in 42% cases by Johanson *et al*. [35], this higher rate may be a reflection of bigger sized babies in western population leading to prolonged second stage of labor. Opinions differ as to what should be a significant delay and obstetrics cannot run by a clock. By the last decade of the nineteenth century, the 2 hour second stage rule seems to have become well established.

**Occipitoanterior position (percentage):** The occipitoanterior position was the commonest in either of the group i.e. 80% in forceps group &78% in vacuum group. Studies done by shihsdesh *et al*. & Johnson *et al*. correlate well with present study [15, 16].

**Second Stage of Labor**: There was no statistical difference in the durations second stages of labor in the forceps and vacuum group. The duration of second stage is lesser, probably due to the higher incidence of fetal distress requiring an early

intervention in the second stage in the present study.

| Authors | 2nd Stage (Minutes) | |
|---|---|---|
| | Forceps | Vacuum |
| Dell [17] (1985) | 72±38 | 78±44 |
| Williams [12] (1991) | 112±81 | 121±73 |
| Johanson [9] (1993) | 82±63 | 56±74 |
| Present Study (2023-2025) | 28.3 | 31.32 |

**Distribution of groups by outcome of instrumental vaginal delivery**

A successful delivery was defined as the ability to deliver by the allotted instrument within the mandates of study criteria [18, 19]. In the present study, out of 100 attempts, 95 were successful, i.e. the success rate was 95%. The success rate of forceps was 96% and that of vacuum was 94%. The difference was statistically not significant. The low failure rate of instrumental vaginal deliveries, both forceps and vacuum in the present study could be due to selection of a particular instrument by the accoucheur according to his clinical judgement, rather than a randomized allotment.

**Mode of delivery of failed cases of instrumental vaginal delivery**

Two cases (4%) in forceps group failed to deliver by allotted instrument, both of these were delivered by caesarean section. Three cases (6%) in vacuum group failed, 2 of these delivered by forceps application and 1 delivered spontaneously with good uterine contractions. There were two cases of failed forceps (failure rate 4%). In one of these cases there was difficulty in application of forceps as the rotation was incomplete and occiput posterior position was present. The forceps did not lock in these cases. Patient was taken up for caesarean section and gave birth to a 3.8 kg baby. In the other case of failed forceps; after locking of the blades, there was no descent with traction. It was low forceps application & underwent a caesarean section with a 4.2 kg baby, obviously the possibility of cephalopelvic disproportion was missed. There were 3 cases of failed vacuum attempts (failure rate being 6%), all due to more than three pop offs.

Two of these failed cases were delivered by forceps, one was short of rotation and second had occipto posterior position. In the remaining one case, the vacuum attempts managed to bring about descent but failed due to more than three pop-offs. The baby was delivered in the next five minutes spontaneously with good uterine contractions. The decision of the mode of delivery in cases of failed instrumental vaginal delivery was left upto the decision of the attending obstetrician.

In his prospective study of 81 cases, Dell *et al*. [17] reported 13 failed cases, 16% failure rate. He recorded 10 failed vacuum extractions and 3 failed forceps. The causes of failure of forceps was difficulty in locking the blades in all three cases where as failed vacuum attempts were due to pop offs. None of the failed instrumental deliveries underwent caesarean section. The mode of delivery in these failed cases is depicted in the bar diagram below.

Willaims [12] *et al*. (1991) reported that vacuum applications were successful in all 48 cases, whereas forceps was successfully applied in 41 of 51 cases (80%) ($p$<0.001). Forceps assisted deliveries were successful in 40 of 41 successful applications (98%), and vacuum assisted deliveries occurred in (83%) of successful application ($p$<0.03). Successful delivery occurred in 83% of attempted vacuum and 78% of attempted forceps deliveries, a difference that was not statistically significant. With the exception of one caesarean delivery in the vacuum group and two in the forceps group, all patients with method failure were successfully delivered by the alternate procedure. Also there was no significant difference noted between failed vacuum and forceps deliveries for birth weight or head circumference. Johanson [9] *et al*. (1993) conducted a trial in four district general hospitals across West Midlands. Overall, 251 (85%) women in vacuum extractor group and 279 (90%) in forceps group were delivered by allocated instruments, (Odds ratio 0.164, P=0.07). The increase in caesarean sections seen in forceps group was not statistically significant. 15 of 18 caesarean sections were for occipito posterior position. A number of the deliveries were described as protocol failures in that the incorrect instrument was used. In this context, the particular weakness of silicone cup in delivering babies with excessive caput or a deflexed head was demonstrated.

**Birth weights of babies in grams:** The lower birth weight in the present study may be due to physiologically smaller babies in Indian population as compared to western standards.

| Authors | Forceps | Vacuum |
|---|---|---|
| Williams[12](1991) | 3393±459 | 3440±510 |
| Johanson[9](1993) | 3460±500 | 3460±450 |
| Present study (2023-2025) | 2.820 | 2.940 |

**Neonatal outcome:** Neonatal morbidity has always been a concern, especially in todays litigaceous environment.

**Cephalhematoma (percentage):** Study done by Bird GC [14] *et al*. had cephalhematoma 3% in forceps & 9% in vacuum This is comparable to another study which concluded that neonates delivered with vacuum have more chance of which is comparable with present study, in which no cases in forceps had cephalhematoma while 2% in vacuum group.

| Authors | Forceps | Vacuum |
|---|---|---|
| Bird GC [14] (1976) | 3 | 9 |
| Prapas [11] ( 2009) | 4 | 7.7 |
| Johanson [16] (2004) | 12.5 | 20.5 |
| Present Study (2023-2025) | 0 | 2 |

**Abrasions (percentage):** When properly applied forceps adds to the volume passing through the introitus, where as vacuum cup adds no extra volume. This may partly explain the tendency of more lacerations, face marks & abrasions in forceps group. Study done by Johanson *et al*. correlates well with the present study that is the forceps group had more of face marks & abrasions. Other studies are consistent with the present study. Facial palsy was seen in one case of forceps delivered babies in the present study, same as reported by Johanson *et al*. [16]. There was no case of ERBS palsy in the present study.

| Author | Forceps | Vacuum |
|---|---|---|
| Williams [12] 1991 | 18 | 2 |
| Johanson [16] (2004) | 5.4 | 3.7 |
| Present Study (2023-2025) | 10 | 0 |

**Neonatal hyperbilirubinemia (Percentage):** Study done by Aliya *et al*. had Neonatal hyperbilirubinemia 4% in forceps & 6% in vacuum which is comparable with present study.

| Author | Forceps | Vacuum |
|---|---|---|
| S. Achanna [10] (1994) | 7 | 12 |
| Aliya [13] (2008) | 4 | 6 |
| Present Study (2023-2025) | 4 | 6 |

**Maternal outcome**

Rightly has it been said, "An attempted vaginal delivery is not a tug of war. In other words, he who pulls hardest does not always achieve the best results. [21] This has to be kept in mind during every instrumental vaginal delivery to ascertain an uninjured mother and a healthy baby.

**Episiotomy extension and perineal tear: (Percentage)**

| Author | Forceps | Vacuum |
|---|---|---|
| Williams [12] 1991 | 12 | 4 |
| Present Study (2023-2025) | 8 | 4 |

**Vaginal laceration: (Percentage):** Local perineal trauma has been reported in several studies of instrumental deliveries since ages, especially with forceps extraction. Episiotomy extensions occurred in 6% cases, more in forceps group (8%) than in vacuum group (4%), the difference being insignificant. Perineal tears were present in 20 cases, again more in forceps group; but not significantly higher. Two cases of 4$^{th}$ degree perineal tears occurred in forceps group, both in cases of occiput posterior position. During face to pubes deliveries, the large biparietal diameter is more posterior and hence chances of perineal tears higher. The tear was sutured immediately and post-natal period was uneventful. P.K. Devi [22] noted perineal trauma in 9% of outlet forceps and 13% in mid cavity ones.

A perineal tear is caused when head is delivered suddenly with a jerky movement. Slow extension of head and allowing the increasing diameter of fetal head to pass through vulva gradually, prevents perineal injuries. Dell [17] *et al*. recorded a 22% rate of perineal trauma in forceps group v/s 33% in vacuum group. His study involved only outlet extractions. In the present study, there were 5 cases of vaginal lacerations, in forceps group (10%) and 2 in vacuum group (4%). It is evident that forceps group had comparatively more of vaginal lacerations than vacuum group. Study by Damania *et al*., Johnson *et al*. correlates well with present study.

| Author | Forceps | Vacuum |
|---|---|---|
| Damania [23] 1989 | 11 | 5 |
| Johanson [16] (2004) | 19 | 9.7 |
| Present Study (2023-2025) | 10 | 4 |

**Cervical tear:** In present study 2 cases of cervical tear in forceps group only & no cases in vacuum group. It correlating well with other studies showing higher incidence of cervical tear in forceps than in vacuum group.

| Author | Forceps | Vacuum |
|---|---|---|
| Damania [23] 1989 | 4 | 0 |
| Shihadeh [15] (2001) | 4.67 | 1.43 |
| Present Study (2023-2025) | 2 | 0 |

**Conclusions**

When careful attention is given to the indications, pre requisites and performance of procedure during instrumental vaginal delivery, whether obstetric forceps or vacuum extraction, optimal results can be expected. We can conclude that the ancient art of instrumental vaginal delivery surely has an ongoing role in modern obstetrics and is a safe and effective mode of delivery in the hands of trained accoucheur, when used at right time and with the correct technique

**From the present study one can conclude that:-**

- Fetal morbidity is less common in vacuum compared to forceps deliveries.
- The APGAR at birth & 5 minutes was similar in both vacuum & forceps deliveries.
- Cephalhematoma was common with vacuum while scalp injury, abrasions common with forceps deliveries
- Perineal tear, cervical tear & vaginal lacerations, extension of episiotomy are common with forceps than vacuum deliveries.
- Also the failure rate of vacuum in greater than that of forceps, though this difference was not statistically significant. Failure was common in difficult extractions, that with low applications and when occipito-posterior and rotations greater than 45° were encountered.

**Recommendation**

- Determination of which instrument to use for an operative vaginal delivery should entail weighing the risks and benefits of the instrument to both the mother and the fetus.
- Forceps or vacuum should be applied only after fulfillment of following criteria
  - Informed consent.
  - Indication should be clearly established & documented.
  - Bladder must be emptied prior to application of forceps or ventouse.
  - Major degree of cephalopelvic disproportion should be ruled out.
  - The fetal head must be engaged.
  - Cervix must be fully dilated.
  - Membranes must be ruptured.
  - Exact presentation and position of fetal head must be suitable
  - Episiotomy during traction when perineum becomes bulged & thinned out by advancing head.
  - Anaesthesia pudendal block supplemented by perineal & labial infiltration with 1% lignocaine hydrochloride

**Conflict of Interest**

Not available

**Financial Support**

Not available

**References**

1. Bailey PE. The disappearing art of instrumental delivery: time to reverse the trend. International Journal of Gynecology and Obstetrics. 2005;91(1):89-96.
2. Campbell S, Lees C. Operative interventions in obstetrics. In: Obstetrics by Ten Teachers. 17$^{th}$ Ed. London: Arnold; 2000, p. 285-296.
3. O'Mahony F, Hofmeyr GJ, Menon V. Choice of instruments for assisted vaginal delivery. Cochrane Database of Systematic Reviews. 2010;(11):CD005455. DOI: 10.1002/14651858.CD005455.pub2.
4. Martin JA, Hamilton BE, Sutton PD, Ventura SJ, Menacker F, Munson ML. Births: Final data for 2002. National Vital Statistics Reports. 2003;52(10):1-113.
5. Demissie K, Rhoads GG, Smulian JC, Balasubramanian BA, Gandhi K, Joseph KS, *et al*. Operative vaginal delivery and neonatal and infant adverse outcomes: population based retrospective analysis. British Medical Journal. 2004;329(7456):24-29.
6. Caughey AB, Sandberg PL, Zlatnik MG, Thiet MP, Parer JT, Laros RK Jr. Forceps compared with vacuum: Rates of neonatal and maternal morbidity. Obstetrics and

Gynecology. 2005;106:908-912.
7. Hook CD, Damos JR. Vacuum-assisted vaginal delivery. American Family Physician. 2008;78(8):953-960.
8. O'Mahony F, Hofmeyr GJ, Menon V. Choice of instruments for assisted vaginal delivery. Cochrane Database of Systematic Reviews. 2010;(11):CD005455. DOI: 10.1002/14651858.CD005455.pub2.
9. Johanson RB, Rice C, Doyle M, Arthur J, Anyanwu L, Ibrahim J, *et al*. A randomized prospective study comparing the new vacuum extractor policy with forceps delivery. British Journal of Obstetrics and Gynaecology. 1993;100:524-530.
10. Archanna S, Monga D. Outcome of forceps delivery versus vacuum extraction: A review of 200 cases. Singapore Medical Journal. 1994;35:605-608.
11. Prapas N, Kalogiannidis I, Masoura S, *et al*. Operative vaginal delivery in singleton term pregnancies: Short term maternal and neonatal outcomes. Hippokratia. 2009;13:41-45.
12. Williams M, Knuppel R, O'Brien W, Weiss A, Kanarek K. A randomized comparison of assisted vaginal delivery by obstetric forceps and polyethylene vacuum cup. Obstetrics and Gynecology. 1991;78:789-794.
13. Islam A, Murtaza JN. Vacuum extraction and forceps deliveries: Comparison of maternal and neonatal complications.
14. Bird GC. The importance of flexion in vacuum delivery. British Journal of Obstetrics and Gynaecology. 1976;83:194-200.
15. Shihadeh A, Al-Najdawi W. Forceps or vacuum extraction: A comparison of maternal and neonatal morbidity. Eastern Mediterranean Health Journal. 2001;7(1-2):106-114.
16. Johnson JH, Figueroa R, Garry D, Elimian A, Maulik D. Immediate maternal and neonatal effects of forceps- and vacuum-assisted deliveries. Obstetrics and Gynecology. 2004;103:513-518.
17. Dell DL, Sterling, Warren C. Soft cup vacuum extraction: A comparison of outlet delivery. Obstetrics and Gynecology. 1985;66:624-628.
18. Munro Kerr J. Munro Kerr's Operative Obstetrics. 11th Ed. Mysore: AITBS Publishers; p. 91-127.
19. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap LC, Wenstrom KD. Williams Obstetrics. 23rd Ed. New York: McGraw-Hill; Forceps delivery and vacuum extraction, p. 512-538.
20. Malmström T. The vacuum extractor: an obstetrical instrument and the parturiometer: A tokographic device. Acta Obstetricia ET Gynecologica Scandinavica Supplement. 1957;36(Suppl 3):7-50.
21. Williams MC. Vacuum assisted delivery. Clinics in Perinatology. 1995;22(4):933-952.
22. Devi PK. A review of forceps deliveries over a five year period. Journal of Obstetrics and Gynecology of India. 1958;8:108-113.
23. Damania KR. The prophylactic silastic vacuum extraction. Journal of Obstetrics and Gynaecology of India. 1989;39(2):190-192.

**How to Cite This Article**
Darda P, Patil D, Agrawal A. Instrumental vaginal deliveries (Forceps and Ventouse) maternal & neonatal outcome. International Journal of Clinical Obstetrics and Gynaecology. 2026;10(1):460-467.