

Role of Instrumental Deliveries in Modern Obstetrics: Analysis of 64 Cases

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Abstract: Instrumental (operative vaginal) delivery is the use of forceps or vacuum to assist in the vaginal delivery of the fetus. It is performed when expeditious delivery is required for maternal and fetal indications and spontaneous vaginal delivery is not imminent [1–3]. The two principal instruments used for assisted vaginal birth are forceps and vacuum, and the choice depends on the clinical situation, operator experience, and availability [2]. Instrumental deliveries account for 10–15% of all vaginal births worldwide.

Keywords: Instrumental Delivery; Operative Vaginal Delivery; Forceps; Vacuum; Obstetrics; Maternal Outcome; Neonatal Outcome.

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I. INTRODUCTION

Instrumental (operative vaginal) delivery is the use of forceps or vacuum to assist in the vaginal delivery of the fetus. It is performed when expeditious delivery is required for maternal and fetal indications and spontaneous vaginal delivery is not imminent. Instrumental deliveries account for 10–15% of all vaginal births worldwide.

II. AIM AND OBJECTIVES

- The aim of the study is to analyse maternal and fetal outcomes in patients undergoing instrumental deliveries.
- To compare the use of forceps and vacuum deliveries.
- To analyse the indications for instrumental vaginal deliveries.

III. MATERIALS AND METHODS

Study design: Retrospective observational study.

Study setting: Department of Obstetrics and Gynecology, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry.

Study period: 2023–2024.

Sample size: 64 instrument-assisted vaginal deliveries.

Data recorded included type of instrument used, indications for use, maternal complications, and neonatal complications.

Table 1. Indications for Instrumental Delivery

Indication	Forceps (n=28)	Vacuum (n=36)	Total (n=64)	%
Fetal distress	12	10	22	34.4%
Prolonged 2nd stage	8	16	24	37.5%
Maternal exhaustion	5	8	13	20.3%
Medical indications (heart disease, PIH)	3	2	5	7.8%

Table 2. Maternal Complications

Complication	Forceps (n=28)	Vacuum (n=36)	Total (%)
Perineal tear	10 (35.7%)	4 (11.1%)	21.9%
PPH	2 (7.1%)	1 (2.8%)	4.7%
Cervical/vaginal laceration	3 (10.7%)	1 (2.8%)	6.2%
No major complications	13 (46.5%)	30 (83.3%)	67.2%

Table 3. Neonatal Outcomes

Outcome	Forceps (n=28)	Vacuum (n=36)	Total (%)
Facial bruising/marks	5 (17.8%)	2 (5.6%)	10.9%
Cephalohematoma	1 (3.5%)	6 (16.7%)	10.9%
Neonatal jaundice	1 (3.5%)	4 (11.1%)	7.8%
NICU admission	2 (7.1%)	3 (8.3%)	7.8%
No complications	19 (67.8%)	21 (58.3%)	62.5%

IV. RESULTS

There was a total of 64 instrument-assisted vaginal deliveries done at Sri Lakshmi Narayana Institute of Medical Sciences during 2023–2024. Majority of the participants were primigravida aged 21–30 years. Maternal exhaustion with inadequate expulsive effort was reported as a major indication for vacuum or forceps-assisted vaginal deliveries in this study. Around 62 (97%) children delivered had an APGAR score of >6 at 1 minute and only 2 babies delivered with vacuum-assisted delivery had an APGAR score of <6 at 1 minute. Overall, 80% of the children had a birth weight over 2.5 kg.

➤ Clinical Implications

The findings of this study have practical implications for obstetric services. First, the relatively greater use of vacuum in this series suggests that vacuum extraction is an important component of routine operative vaginal practice in the study setting. Second, the observed maternal trauma associated with forceps reinforces the need for careful instrument selection and attention to perineal protection. Third, neonatal complications following vacuum highlight the importance of correct cup placement, controlled traction and appropriate neonatal observation. Finally, regular simulation-based training and supervised procedural experience may improve confidence and consistency among clinicians performing assisted vaginal births.

➤ Follow-Up and Quality Improvement

Immediate post-delivery assessment should include documentation of the instrument used, indication, fetal head position and station, number of applications or traction attempts where relevant, maternal genital tract examination, estimated blood loss, neonatal condition, and any admission to higher-level neonatal care. A structured audit of assisted vaginal births can help identify avoidable complications and training needs. Monitoring rates of successful assisted birth, failed procedures, significant perineal trauma, neonatal injury and NICU admission can provide useful quality indicators for a maternity unit.

➤ Informed Consent and Shared Decision-Making

Although instrumental delivery is frequently performed in urgent intrapartum circumstances, communication with the

woman and her birth companion remains important whenever the clinical situation permits. The expected indication, proposed instrument, likelihood of success, potential maternal and neonatal complications, and alternatives should be explained. Alternatives may include continued pushing when clinically appropriate or caesarean birth, depending on fetal station, maternal condition and urgency. Shared decision-making is particularly relevant when more than one clinically reasonable approach is available [7].

➤ Neonatal Outcomes in the Present Study

Neonatal outcomes also differed between the two groups. Facial bruising or marks were more frequent following forceps, while cephalohematoma and neonatal jaundice were more frequent following vacuum delivery. NICU admission occurred in 2 forceps cases and 3 vacuum cases. Importantly, 62 of 64 newborns (97%) had an APGAR score above 6 at one minute according to the study data, and approximately 80% had a birth weight greater than 2.5 kg. These findings indicate that most neonates in this series had satisfactory immediate outcomes, while also demonstrating the need for systematic neonatal examination after instrumental birth.

➤ Maternal Outcomes in the Present Study

In the present study, maternal complications were more frequent in the forceps group than in the vacuum group. Perineal tear occurred in 10 of 28 forceps deliveries (35.7%) compared with 4 of 36 vacuum deliveries (11.1%). Cervical or vaginal laceration and postpartum haemorrhage were also recorded more frequently among forceps-assisted births. These observations support the clinical importance of anticipating perineal and genital tract trauma after forceps delivery. However, because this was a retrospective single-centre study with only 64 cases, the observed difference should be interpreted as a description of the study population rather than proof of a causal difference between instruments.

➤ Importance of Operator Skill and Procedural Safety

The technical skill of the operator is a major determinant of outcome. Correct identification of fetal head position, appropriate instrument application, controlled traction in the axis of the pelvis, and recognition of failed progress are central safety principles.

Rotational procedures require additional expertise and should be undertaken only by appropriately trained clinicians or under direct supervision of an experienced operator. Current professional guidance also emphasises that clinicians should be competent in both forceps and vacuum for non-rotational births and should maintain access to appropriate emergency facilities if operative vaginal delivery fails [7].

➤ *Forceps Versus Vacuum: Clinical Considerations*

Forceps provide direct grasp and traction on the fetal head and can be particularly useful when rapid delivery is required or when vacuum extraction is unsuitable. Vacuum extraction generally requires less maternal instrumentation and is commonly associated with less maternal perineal trauma, although it can be associated with scalp trauma, cephalohematoma and other neonatal injuries. Evidence comparing the two techniques suggests that forceps may have a higher probability of achieving vaginal birth but at the cost of increased maternal perineal trauma, whereas vacuum may have a different neonatal complication profile [8]. Consequently, the instrument should be selected according to the clinical circumstances rather than on the basis of a universal preference for one device.

➤ *Common Indications and Pre-Procedure Assessment*

The indications observed in the present series—

prolonged second stage, fetal distress, maternal exhaustion, and selected maternal medical conditions—represent the major clinical situations in which assisted vaginal birth may be considered. Before application of an instrument, the clinician should reassess maternal and fetal status, confirm full cervical dilatation, determine fetal head position and station, assess the adequacy of the pelvis, ensure that the membranes are ruptured when appropriate, empty the bladder, provide suitable analgesia, and obtain informed consent. A neonatal team or personnel capable of neonatal resuscitation should be available when the clinical situation suggests an increased risk of neonatal compromise [6,7].

➤ *Clinical Background and Rationale*

Operative vaginal delivery remains an important option when birth needs to be expedited and vaginal delivery is considered achievable and safer than continued labour or a second-stage caesarean birth. Contemporary guidance describes forceps and vacuum extraction as complementary techniques rather than interchangeable procedures. The choice depends on the fetal condition, station and position of the head, maternal condition, urgency of delivery, analgesia, operator competence, and the equipment and neonatal support available. Safe practice therefore requires careful selection of cases and a clear plan for abandoning the procedure if progress is not satisfactory [6,7].

Table 4

Feature	Forceps	Vacuum
Primary mechanism	Direct grasp and traction	Suction cup with controlled traction
Study use	28 cases	36 cases
Perineal tear in study	10 (35.7%)	4 (11.1%)
Facial marks in study	5 (17.8%)	2 (5.6%)
Cephalohematoma in study	1 (3.5%)	6 (16.7%)
General consideration	Often useful when rapid/precise traction is needed	Often associated with less maternal perineal trauma

V. DISCUSSION

In this study, instrumental vaginal delivery was used to facilitate expeditious vaginal birth when spontaneous vaginal delivery was not imminent. Operative vaginal birth remains an important component of modern labour management, and safe use of forceps or vacuum requires appropriate clinical assessment and operator competence [1,2]. The recorded indications in the present study included prolonged second stage of labour, fetal distress, maternal exhaustion, and selected medical indications such as heart disease and pregnancy-induced hypertension. These indications are consistent with established clinical indications for assisted vaginal birth [2,3]. The distribution of maternal and neonatal complications differed between forceps and vacuum deliveries. The present study observed more maternal complications with forceps and more neonatal complications with vacuum. This pattern is broadly consistent with evidence that forceps can be associated with greater maternal perineal trauma, while the choice of instrument and neonatal morbidity depends on clinical circumstances and operator factors [2,3]. A recent systematic review and meta-analysis also supports differences in complication profiles between

forceps and vacuum, although the certainty of evidence varies across outcomes [4].

VI. CONCLUSION

- In this study of 64 instrumental-assisted vaginal deliveries, the majority were conducted using vacuum compared with forceps.
- The most common indications were prolonged second stage of labour and fetal distress.
- Maternal complications were more frequent with forceps, while neonatal complications were more frequent with vacuum.
- Despite these differences, overall maternal and neonatal outcomes were satisfactory.
- Instrumental vaginal deliveries continue to be a safe and effective option, provided strict prerequisites are met and the procedure is performed by a skilled obstetrician.

VII. LIMITATIONS

- Single-centre study; findings may not represent wider populations.
- Retrospective design; depends on the accuracy and completeness of medical records.
- Small sample size (64 cases), limiting generalizability of the results.
- Operator skill variability; outcomes may differ depending on the obstetrician's experience with forceps or vacuum.
- Short-term follow-up; only immediate maternal and neonatal outcomes were assessed and long-term effects were not evaluated.

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