e-ISSN: 0975-9506, p-ISSN:2961-6093

Available online on www.ijpqa.com doi: 10.25258/ijpqa.16.12.29

International Journal of Pharmaceutical Quality Assurance 2025; 16(12); 168-173

Original Research Article

Outcome of Operative Vaginal Delivery in a Tertiary Care Center - A Prospective Observational Longitudinal Study

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Received: 01-10-2025 / Revised: 15-11-2025 / Accepted: 04-12-2025

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Conflict of interest: Nil

Abstract

Introduction: In modern obstetrics, lowering the prevalence of primary cesarean deliveries is a top priority for maternal safety. In certain circumstances during the second stage of labor, operational vaginal delivery (OVD) is a desirable alternative to cesarean delivery.

Objective: This prospective observational longitudinal study aims to provide the outcomes of operative vaginal delivery in a tertiary care center.

Method: This study comprised 150 pregnant women with gestational ages ranging from 37 to 42 weeks. The study recorded maternal outcomes: third degree perineal tears or cervical tear or vaginal lacerations, injury to bladder, bowel, uterus; post-partum hemorrhage and need for blood transfusion and fetal outcome: admission to Neonatal intensive care unit (NICU) / Special Newborn Care Unit (SNCU), any birth trauma to the new-born and APGAR scores at first and fifth minutes of birth.

Results: In women who delivered via surgical vaginal delivery, there were no perineal tears, postpartum hemorrhage, blood transfusion requirements, or problems in 71.33%, 86.66%, 94.66%, and 86% of cases, respectively. About 94.66% of babies had normal birth weight (2500-3999) and 3.33% had more than 4 kg of birth weight who were born with the aid of operative vaginal delivery. Absence of need for hospitalization, complications and successful discharge were recorded in 90%, 90% and 97.33% of babies who were delivered via operative vaginal delivery.

Conclusion: When difficulties emerge during the second stage of labor, OVD remains a safe and viable option.

Keywords: Operative vaginal delivery; Instrumental delivery; Maternal outcomes; Neonatal outcomes; Second stage of labor; Cesarean section reduction; Obstetric safety; Forceps/vacuum delivery; Birth trauma; Postpartum complications.

Introduction

Pregnancy is a natural phenomenon, and the entire process—from conception to delivery—is accompanied by feelings of pain, anxiety, and even dread for both the mother and the unborn child's deaths. Therefore, giving birth is a complex process with physical, emotional, social, physiological, cultural, and psychological components.[1]

Physical, psychological, environmental, and supportive aspects are linked to attitudes towards labor pain, and these factors have a significant impact on the choice of delivery method.[1] A safe delivery is one of the key objectives of every medical team involved in childbirth. For maternal or fetal indications, operative vaginal delivery (OVD) has been utilized to achieve or accelerate a safe vaginal birth. The inability to push effectively due to maternal exhaustion is one example. Other signs include prolonged second stage of labor, arrest of descent or rotation of the fetal head, and unsettling fetal heart rate patterns in the second stage of labor. Because it prevents cesarean delivery and the associated morbidities, operative vaginal birth is advantageous for women. [2]

Operative vaginal births made up 3.3% of all deliveries in 2013, compared to 9.01% of all deliveries in 1992. Nevertheless, operational vaginal birth is still a crucial component of contemporary obstetric treatment and, under the right conditions, can be used to safely avoid caesarean delivery. Operative vaginal births are carried out by either using forceps to provide direct traction on the fetal skull or a vacuum extractor to impart traction to the fetal scalp.[2]

Therefore, we carried out a prospective observational longitudinal study to provide the outcomes of operative vaginal delivery in a tertiary care center.

Materials and Methods

A prospective observational longitudinal study was conducted in the Department of Obstetrics and Gynecology from April 2022 to September 2023. The study was approved by the Research Ethics Committee of the Department of Obstetrics and Gynecology at Chittaranjan Seva Sadan, Kolkata. Patient data were collected from the delivery ward and neonatal unit registries, as well as the hospital information system. Neonatal data were obtained immediately after delivery or at the time of hospital discharge.

Informed consent was obtained from mothers in the local language. Pregnant women admitted with gestational ages between 37 and 42 weeks were included. There were no dropouts during the study period.

The following data were collected:

Maternal Demographics: age, body mass index (BMI), gravidity, parity, and medical and cesarean history.

Delivery Details: gestational age at delivery, type of instrument used, and indication for operative vaginal delivery (OVD).

Maternal Outcomes: presence of any third-degree perineal tear, cervical tear, or vaginal laceration; injury to the bladder, bowel, or uterus; postpartum hemorrhage; and the requirement for blood transfusion.

Neonatal Outcomes: APGAR scores at the first and fifth minutes of birth; rate of admission to the NICU/SNCU for special care; and birth trauma related to labor and delivery, such as cephalohematoma, subgaleal hemorrhage, retinal hemorrhage, shoulder dystocia, clavicular fracture, or scalp lacerations.

Inclusion Criteria

- Pregnant women at 37–42 weeks of gestation.
- Presumed fetal compromise in the second stage of labor or late first stage.
- Mothers in the second stage of labor with comorbidities such as cardiac disease (NYHA grades 3 and 4), hypertensive crisis, myopathies, or spinal cord injury.
- Maternal fatigue or exhaustion.
- Nulliparous women with lack of progress for 2 hours (combined active and passive second stage).
- Multiparous women with lack of progress for 1 hour (combined active and passive second stage).

Exclusion Criteria

- Women who did not provide consent.
- Fetuses predisposed to fractures (e.g., osteogenesis imperfecta).
- Malpresentations such as posterior face, brow, transverse lie, or other malpositions contraindicating forceps or vacuum extraction.
- Maternal BMI >30.
- Estimated fetal weight >4000 g or clinically large baby.
- Occipito-posterior position.
- Mid-cavity delivery or cases where more than one-fifth of the fetal head was palpable per abdomen.

Data analysis was performed using statistical software.

Results

A total of 150 pregnant women were included in the study. Among them, 3.33% of women aged 15–19 years underwent operative vaginal delivery (OVD), 42.66% of women aged 20–24 years, 39.33% of women aged 25–29 years, 14% of women aged 30–34 years, and 6% of women aged 35–39 years underwent OVD.

Most participants belonged to the upper middle socioeconomic class (0.66%), followed by 43.33% from the lower middle class, 40% from the upper lower class, and 15.33% from the lower class who underwent operative vaginal delivery.

In terms of gravidity, 66.66% were primigravida, 32.66% were up to fourth gravida, and 0.66% were women of fifth or higher gravida who underwent OVD.

The reported indications for operative vaginal delivery were prolonged second stage of labor in 16.66% of women, fetal distress in the second stage of labor in 78.66%, and maternal exhaustion in 4% of cases (Figure 1).

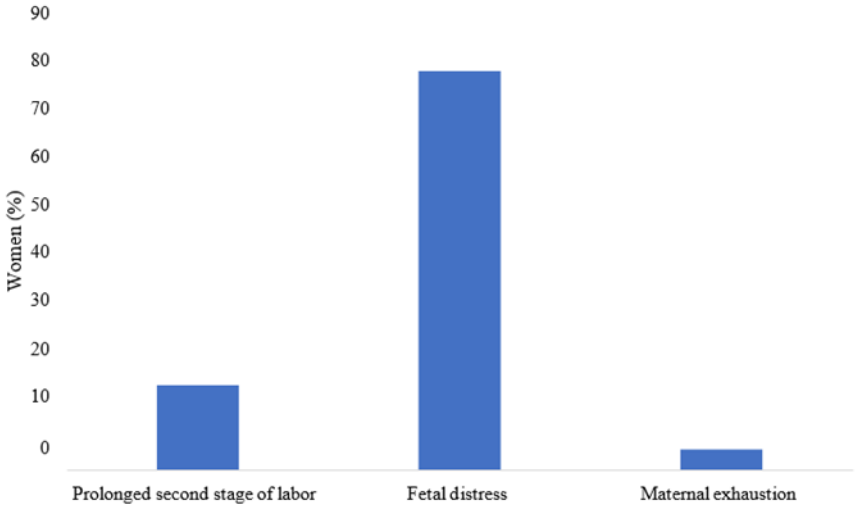

Figure 1: Distribution of indications of OVD

The study also documented 98% with ante natal check-up and 2% of women without ante natal check-up underwent operative vaginal delivery. In this study, 7.33% of women in 37 weeks of gestation, 26% of women in 38 weeks, 56% of women in 39 weeks and 6.66% of women in 40 weeks, 4% of woman in 41 weeks gave birth by operative vaginal delivery (Figure 2).

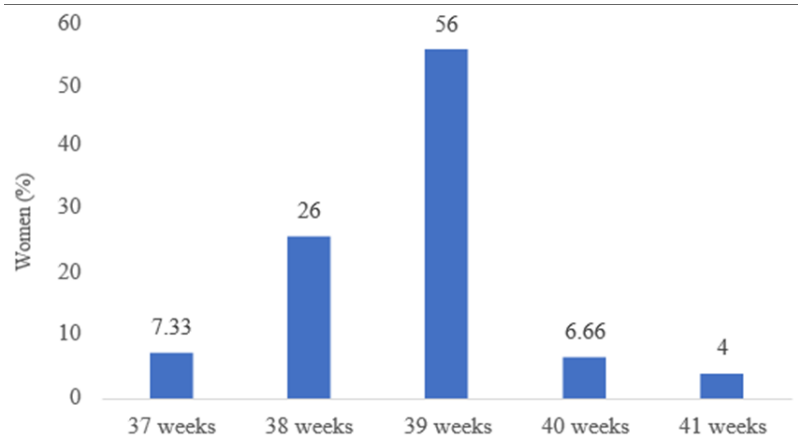

Figure 2: Distribution among mothers according to POG giving birth by OVD

In this study, about 33.33% of women gave birth by vacuum extraction, 58.66% of women gave birth by outlet forceps and 8% of women gave birth by Das forceps (Figure 3). About 92% of women with clear liquor and 8% women with meconium-stained liquor gave birth by operative vaginal delivery.

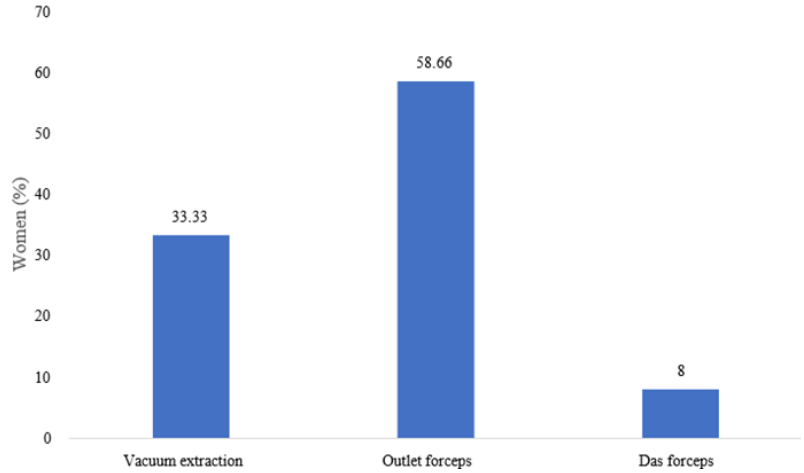

Figure 3: Distribution among mothers according to types of OVD used for delivery

Maternal Outcomes: About 16.66% of women who gave birth by operative vaginal delivery had 1st

degree perineal tear, 10.66% of women who gave birth by operative vaginal delivery had 2nd degree perineal tear, 0.66% of women had 3rd degree and 4th degree perinial tear and 71.33% of women who gave birth by operative vaginal delivery reported absence of tear (Figure 4).

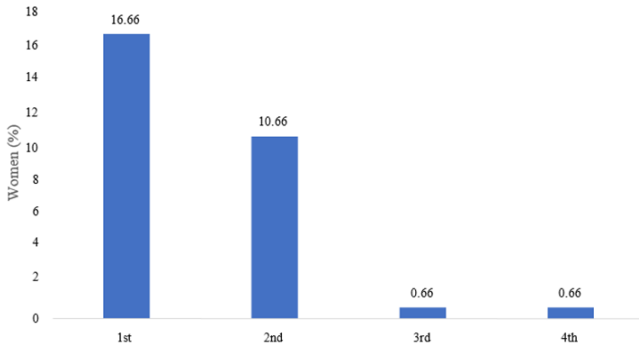

Figure 4: Distribution among Mothers According To Degree of Perineal Tear Giving Birth by OVD

About 86.66% of women did not have postpartum hemorrhage and only 13.33% of women had post-partum hemorrhage who gave birth by operative vaginal delivery. Absence of any need for blood transfusion has been recorded in 94.66% of women and blood transfusion was carried out only for 5.33% of women. This study also documented that only 14% of women had complications and 86% of women did not have any complications who underwent operative vaginal delivery (Figure 5).

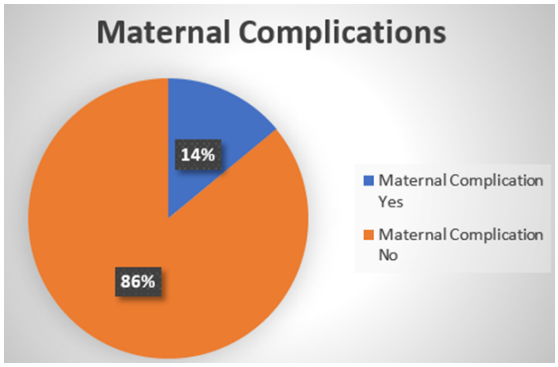

Figure 5: Distribution showing maternal complications who delivered by OVD

Neonatal outcomes: About 94.66% of babies had normal birth weight (2500-3999) and 3.33% had a birth weight of more than 4 kg who were born with the aid of operative vaginal delivery, while only 2% had low birth weight (1500-2499gm). Ninety percent of babies did not require hospital admission and only 10% of the babies who required hospital admission were born with the aid of operative vaginal delivery. Absence of birth asphyxia has been recorded in about 91.33% of babies and only 8.67% of babies reported birth asphyxia. Cephalic Hematoma, Scalp Laceration was observed in 0.66%, 2.66%, respectively who were delivered through OVD. About 96.66% of the babies did not have any birth trauma and were born with the aid of operative vaginal delivery (Figure 6).

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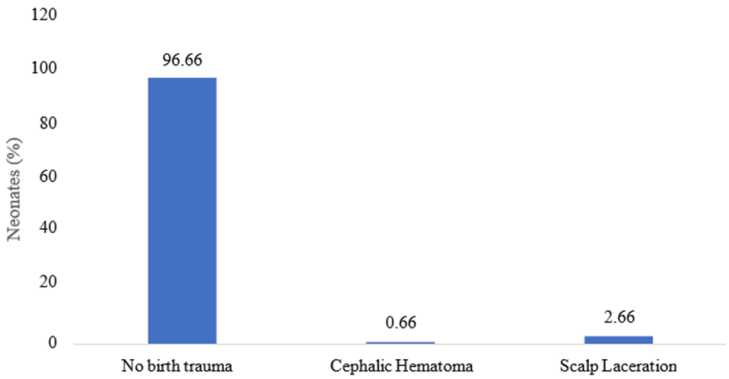

Figure 6: Distribution among babies according to Birth Trauma who were borne by OVD

About 97.33% of the babies were successfully discharged and 2.66% of the babies expired who were born with

the aid of operative vaginal delivery. Only 10% of neonates had complications rest 90% had no complications who were delivered by operative vaginal delivery (Figure 7).

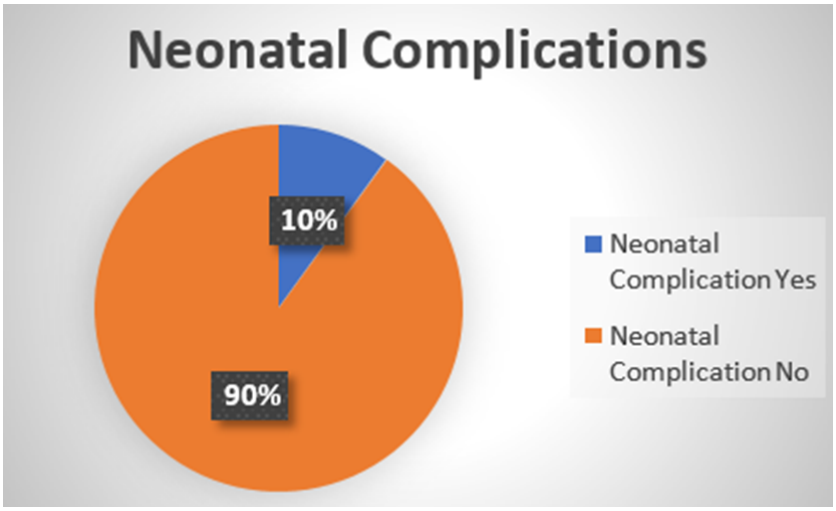

Figure 7: Distribution showing neonatal complications who were borne by OVD

Discussion

The prevalence of OVD application is 3.19% in Chittaranjan Seva Sadan college of obstetrics gynecology and child health and the finding is consistent with other studies. Even though operational vaginal births may only occur in 1.5% of deliveries in some nations, they may occur in as many as 15% of deliveries in other nations.[3]

Fetal distress was the commonest indication (78.66 %) for OVD among the 150 cases followed by prolonged second stage labor (16.66%) and maternal exhaustion (4%). These findings are consistent with other studies. A five- year retrospective study conducted at Pondicherry Institute of Medical Sciences, Puducherry reported that the main markers for instrumentation were an unsettling fetal heart (45.3%), maternal tiredness (23.9%), a prolonged second stage of labor (10.7%), a maternal recommendation to shorten the second stage of labor (13.1%), and an unrotated fetal head (7.1%).[4] Another retrospective observational study involving 120 women reported fetal distress (47.5%). A study carried out at Tikur Anbessa Hospital also reported that the most common indication for OVD is fetal distress (45.3%).[5]

In this study, 1st, 2nd, 3rd and 4th degree perineal tear occurred less frequently (16.66% 10.66%, 0.66%, and 0.66%, respectively); whereas, about 71.33% of women who gave birth by operative vaginal delivery reported absence of tear. This study also reported that 86.66% of women reported absence of postpartum hemorrhage and about 94.66% of women did not require blood transfusion after operative vaginal delivery. In this study about 94.66% of babies had normal birth weight (2500-3999 gm) and 3.33% had a birth weight of more than 4 kg birth weight who were born with the aid of operative vaginal delivery. Also, this study showed that only 8.67% babies had birth asphyxia and 91.33% babies reported absence of any birth asphyxia who were delivered by operative vaginal delivery.

This study found that only 14% mothers and 10% neonates had complications who were delivered by operative vaginal delivery. Thus, the overall rate of maternal complications of 14% with postpartum hemorrhage (3.3%) being the commonest maternal complications.

A facility-based cross-sectional study design with 2348 pregnant mothers reported overall rate of maternal complications as 14%. Postpartum hemorrhage (3.3%) was the most frequent maternal complications, and this can be explained by genital tract laceration (62.5% postpartum hemorrhage, PPH)), which is also associated with PPH related to uterine atony during prolonged labor. However, the study done at Aminu Kano Teaching Hospital, Kano, Nigeria found that the rate of PPH among operative vaginal deliveries was 9.5%; the lower rate of PPH among surgical vaginal deliveries is likely the result of less experience in recording estimated blood loss and calculating postoperative hematocrit for at least suspected PPH cases.[3]

Fetal morbidity in vacuum deliveries is 10%, and 0.66 percent of these complications were cephalhematomas, which is evidence that vacuum deliveries are significantly associated with fetal morbidity. 8.67% of births were severely asphyxiated. This is contrasted with the results of numerous investigations; for instance, a study conducted at the Aminu Kano Teaching Hospital in Kano, Nigeria, found that asphyxia occurs at a rate of 4.8%. The hypoxia, however, might be the result of the labor events that suggested the intervention rather than the operational vaginal procedure itself; therefore, this may not actually be linked to the

treatment.[3]

Among the 150 OVDs, neonates with low APGAR scores (4-6) at first and fifth minutes were 23 (15.33%) and 15 (10%), respectively. In this study, fetal distress was the most frequent reason for OVD and the most frequent reason for low APGAR scores at the second and fifth minutes among reasons for operative vaginal deliveries, which explains why the rate of low APGAR scores is higher than in other studies. This study as well as many other studies revealed a strong relationship between the OVD instrument used and the newborn outcome, with 33.33% of moms who gave delivery by vacuum being less likely to experience a positive outcome than those who used forceps.[3]

Amniotic fluid stained with meconium has been linked to adverse neonatal outcomes, 8% of mothers with meconium-stained amniotic fluid are less likely to have favorable neonatal outcome than those with clear amniotic fluid. Studies have shown meconium transit secondary to pre- existing intrauterine fetal compromise or hypoxia can account for the link. In this study, maternal complications were much lower than second stage c-section. The overall rate of PPH was 3.3%; whereas a study conducted on Fetomaternal Outcome in Cesarean Sections in Second Stage of Labor at Adichunchanagiri Institute of Medical Sciences, B.G Nagara. Mandya found that rate of PPH in second stage c-section was 26.9%[6] Another prospective cohort study conducted at Government Dharmapuri Medical College, Dharmapuri, Tamil Nadu, India reported that second stage c-section has uterine atony of 33.2%.[7] In those studies, some patients needed surgical management to control PPH. In this study, no patient needed surgical management of PPH.In a study conducted at Adichunchanagiri Institute of Medical Sciences, B.G Nagara reported that 15.3% of patient had febrile morbidity and 19.2% had blood-stained urine during second stage cesareans;[6] however, in this study, febrile morbidity and patient had blood stained urine after operative vaginal delivery was not noted.

The study results must be interpreted under limitations of being a single center, non-comparative study with small number of study participants.

The study reported that the degree of perineal tear is inversely related to operative vaginal delivery. Less number of women reported post-partum hemorrhage, need for blood transfusion after undergoing OVD. Babies born by operative vaginal delivery were mostly of normal birth weight, with few events of birth asphyxia, birth trauma, hospital admission. Also, mothers giving birth by operative vaginal delivery and most of the babies born by operative vaginal delivery reported low rates of complications. Thus, the study concluded that if carried out by a skilled obstetrician, OVD is a great option for caesarean section for women who are unable to give birth naturally with fewer maternal and newborn difficulties.

Conclusion

If performed by a qualified obstetrician, OVD is an excellent substitute for a cesarean section for women who are unable to give birth naturally with fewer complications for the mother and the baby.

Acknowledgements: None.

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