

Trends in Operative Vaginal Delivery at Dubai Hospital: 5-year Retrospective Study

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ABSTRACT

Background: Operative vaginal delivery (OVD) refers to the use of forceps or a vacuum during vaginal delivery, a fundamental component of emergency obstetric and newborn care. But, worldwide, there is a declining trend in the instrumental delivery and increase in cesarean delivery.

Objective: This study aims to assess the current trends, risks, and complications associated with OVD at Dubai Hospital, United Arab Emirates (UAE).

Study design: Retrospective observational study of all women who delivered by OVD over a 5-year period from 2018 to 2022. We collected data on maternal demographics, maternal, and neonatal outcomes and total deliveries.

Results: During the study period, 2.8% of women had successful operative vaginal deliveries. Our incidence remained the same during the study period. We had a total of 273 instrumental deliveries during the study period; out of this, 54.6% were delivered by metal cup, 42% by Kiwi, and 3.3% by forceps. We also noticed the preference of Kiwi over the years as compared with metal vacuum. The most common indication for OVD was fetal distress, accounting for 85.7% of cases. We also noticed a significant increase in OVD for patients on epidural analgesia (14.7% in 2018 vs 43.6% in 2022). Among the patients who underwent instrumental deliveries, 13 cases (4.8% of the total) were identified with 3rd-degree perineal tears. Multiple vaginal lacerations and cervical tears were observed in 25% of the cases. Major perineal tears, the need for suturing in operation theater, and the need for blood transfusion were seen more in women delivered by metal cups as compared with Kiwi and forceps, but not statistically significant. About 13% babies developed neonatal jaundice, and 18.3% babies needed admission to the neonatal intensive care unit (NICU). Shoulder dystocia is more common in babies delivered by metal cups (4.6%).

Conclusion: Operative vaginal delivery remains a crucial component of obstetric care, with stable incidence. We observed a shifting preference toward the Kiwi vacuum extractor over metal cups while fetal distress remained the primary indication.

Keywords: Cephalohematoma, Emergency cesarean delivery, Forceps delivery, Maternal morbidity, Operative vaginal delivery, Perineal tears, Vacuum delivery.

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INTRODUCTION

Operative vaginal delivery (OVD), also known as assisted or instrumental vaginal birth, involves the use of forceps or vacuum extraction to facilitate vaginal delivery.¹ Globally, approximately, 10–20% of the women in labor require obstetric interventions or support, with instrumental delivery accounting for 6–12% of these interventions.² The World Health Organization (WHO) and United Nations Population Fund (UNFPA) emphasize the importance of assisted vaginal delivery in providing comprehensive emergency obstetric and newborn care.³ The incidence of OVD varies across countries, with rates reported as follows: UK: 10–15%;⁴ US: 3%;⁵ Oman: 3.8%;⁶ India: 2.7–7.7%;^{7,8} in Singapore: 10%;⁹ and in Ethiopia: 10%.¹⁰

Despite the historical use of forceps and vacuum assistance by birth attendants, recent trends have indicated a decline in instrumental deliveries, primarily attributed to the increasing rates of cesarean section.¹¹ This decline may be influenced by factors such as a decrease in competence in performing OVD, increasing medico-legal litigations, and the availability of CS as a reliable alternative in the second stage of labor. However, CS carries its own risks, including significant morbidity and implications for subsequent births, such as hemorrhage, blood transfusion, extension of uterine incision, bladder trauma, and difficulties in delivering the fetal head.¹²

While OVD is considered preferable alternative to the second stage cesarean section, it can cause complications to the

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mother and baby. Indeed, OVD carries its own set of potential complications, including risks of pelvic floor injury, obstetric anal sphincter injuries, and a small but notable risk of clinically significant neonatal injuries.¹² Although documented maternal and neonatal morbidity related to OVD exists, the risk of major trauma is low with appropriate utilization of the procedure.¹³

In the UAE, there is a paucity of data regarding the trends and outcomes of OVD. This study aims to bridge this knowledge gap by evaluating the current trends in operative delivery and its associated risks and complications at Dubai Hospital, a tertiary center in the UAE. The instruments utilized for OVD at this facility include the metal cup, Kiwi Omnicup, and outlet forceps. Analyzing these trends and outcomes will provide valuable insights for improving obstetric care and optimizing delivery practices in our setting.

MATERIALS AND METHODS

A retrospective observational study was conducted at Dubai Hospital, a tertiary referral center with 625 beds. The study included patients who underwent successful operative vaginal deliveries within the period from January 1, 2018, to December 31, 2022. The instruments utilized for these deliveries at Dubai Hospital were the Kiwi Omnicup, metal vacuum cup, and outlet forceps. In our hospital, instrumental delivery is performed only when the fetal head is at +2 station or below.

The primary objective of our study was to investigate the incidence of OVD and evaluate any changes in instrument usage trends. Our secondary objective was to assess maternal and neonatal complications associated with these deliveries.

Maternal complications evaluated include major perineal tear (including third- and fourth-degree perineal tears), cervical laceration, high vaginal laceration, the requirement for suturing in the operating theater, postpartum hemorrhage, and the need for blood transfusion following instrumental delivery. Neonatal complications evaluated include birth injuries like intracranial hemorrhage, skull fracture, long bone fracture, injury to central and peripheral nervous system, the need for admission to the neonatal unit, and prolonged jaundice. Given the retrospective nature of the study, a specific power calculation was not performed. The sample size was determined by the available data during the study period. All patients with successful operative vaginal deliveries during the study period were included in the analysis.

For the study, various data were collected to provide a comprehensive analysis of operative vaginal deliveries at Dubai Hospital. Maternal demographics were recorded, including information, such as age, parity, nationality, body mass index (BMI), and previous mode of delivery. Delivery details were documented, including the duration of the second stage of labor, gestational age at delivery, use of epidural analgesia, indication for instrumental delivery, type of instrument used, and whether sequential use of instruments was required.

Maternal outcomes, such as the need for episiotomy, occurrence of perineal tears, requirement for suturing in the operation theater, occurrence of postpartum hemorrhage, and the need for blood transfusion were recorded. Neonatal outcomes examined included birth weight, Apgar scores, need for admission to the neonatal intensive care unit (NICU), occurrence of birth injuries, and the presence of prolonged jaundice. Additionally, the total number of births during the study period was documented.

There remains an ongoing debate regarding the appropriate denominator for calculating instrumental delivery rates, with variations observed across studies in the inclusion or exclusion of elective cesarean sections. In our study, instrumental deliveries were calculated as a proportion of total deliveries. These findings provide valuable insights into the utilization of operative delivery at Dubai Hospital and contribute to the broader understanding of international trends, while acknowledging the methodological differences among studies.

As a retrospective study, we did not have data on failed instrumental delivery, so we excluded them. Ethical approval for the study was obtained from the Dubai Scientific Research Ethics Committee (DSREC-02/2023-09).

By collecting and analyzing these data, we aimed to gain insights into the incidence of OVD, changes in instrument usage trends, and the occurrence of maternal and neonatal complications within our patient population at Dubai Hospital. SPSS Statistics

Table 1: Maternal demographics in operative vaginal delivery

	<i>Kiwi</i>	<i>Metal cup</i>	<i>Forceps</i>
1. Age (mean \pm SD)	29.8 \pm 5.5	28.7 \pm 5.9	30.4 \pm 5.5
2. Parity			
Nulli	53 (46%)	79 (53%)	4 (44%)
Multi	62 (54%)	70 (47%)	5 (56%)
3. Gestational age			
Preterm	4 (3.5%)	5 (3.4%)	4 (44%)
Term	68 (59%)	93 (62%)	3 (33%)
Post-dated	40 (34.8%)	50 (33.6%)	2 (22%)
4. BMI (Mean \pm SD)	28.53 \pm 5.04	29.3 \pm 5.02	26.98 \pm 8.22
5. Previous CS	10 (8.7%)	17 (11.4%)	1 (11%)

software (IBM SPSS Statistics for Windows, Version 25.0.) was used to perform statistical calculations, generate descriptive statistics, conduct inferential analyses, and visualize the results.

RESULTS

During the 5-year study period, a total of 9,888 deliveries were recorded, comprising 6,655 (67.6%) vaginal deliveries and 3,179 (32.3%) cesarean sections. Among the total deliveries, operative vaginal deliveries accounted for approximately 2.8% of the total. The metal cup was the most commonly used instrument for operative vaginal deliveries. In our study, 38% were UAE nationals and rest are expats.

The mean age of the patients included in the study was 29.9 years, with a standard deviation of 5.76 years. There were no significant differences observed in terms of age, parity (number of previous pregnancies), or BMI among the patients delivered by Kiwi, metal cup and forceps. Additionally, it was found that six patients had instrumental deliveries in their previous pregnancies (Table 1).

The most common indication for OVD was fetal distress, accounting for 85.7% of the cases. This was followed by a prolonged second stage of labor, which accounted for 12% of OVDs, and maternal exhaustion, which accounted for 3.3% of OVDs.

Preterm deliveries (deliveries less than 37 weeks) accounted for 13 cases among patients who underwent instrumental deliveries, with the metal cup being the predominant instrument used. The majority of preterm babies in the study had a gestational age of 35–36 weeks.

In our study, sequential instruments were utilized in 12 patients, representing 4.4% of the cases. Notably, no maternal or neonatal morbidity was reported in these cases. Among the patients who required sequential instruments, 7 patients had failed attempts with the Kiwi instrument, 4 patients had failed attempts with the metal cup, and 1 patient had a failed forceps delivery, ultimately necessitating the use of vacuum extraction (Fig. 1, Table 2).

Among the patients who underwent instrumental deliveries, 13 cases (4.8% of the total) were identified with third-degree perineal tears. No cases of fourth-degree perineal tears were observed. Multiple vaginal lacerations and cervical tear were observed in 25% of cases. Approximately, 4.8% of patients required suturing in the operation theater. Rest of the patients were sutured in labor suite with good analgesia. The occurrence of lacerations, postpartum hemorrhage, or suturing in the operation theater was higher in metal cup compared with forceps. Blood transfusion was required for 5 patients out of 149 in the metal cup group

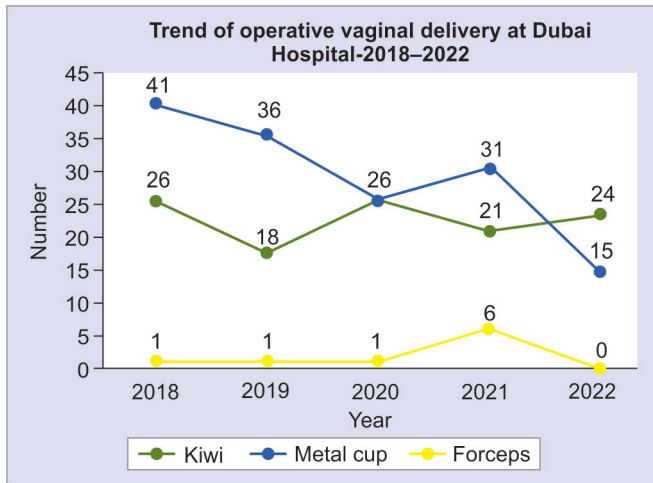


Fig. 1: This figure shows the preference of Kiwi over metal cups over a 5-year period

Throughout the study period from 2018 to 2022, the incidence of OVD at our institution remained relatively consistent, with a rate of around 2.4–2.8% except an increase in 2022 to 3.3%. This contrasts with a study conducted in Puducherry, India, which revealed a declining trend in the proportion of instrumental deliveries from 9.8 to 6.1%.⁸

Similarly, a study conducted in Singapore reported a stable incidence of OVD at approximately 10% over a 5-year period.⁹ These findings highlight the variation in OVD rates across different regions and underscore the importance of contextual factors and local practices in determining delivery trends. Further exploration of these variations can provide valuable insights into the factors influencing instrumental delivery rates and guide efforts to optimize obstetric care.

At our hospital, the instruments used for OVD include Kiwi, metal cups, and outlet forceps. Among these instruments, the metal cup is the most commonly utilized, accounting for approximately 56% of OVD cases. However, on a global scale, the silastic vacuum extractor is considered the instrument of choice for OVD.⁹ The trend

Table 2: Trends of operative vaginal delivery in Dubai Hospital from 2018 till 2022

Year	Total deliveries	Cesarean section	Normal vaginal	Instrumental delivery	Rate	Kiwi	Metal cup	Forceps	Epidural in labor
2018	2417	923 (38.2%)	1426	68	2.8%	26 (38.2%)	41 (60.3%)	1 (1.5%)	10 (14.7%)
2019	2268	828 (36.5%)	1385	55	2.4%	18 (32.7%)	36 (65.5%)	1 (1.8%)	10 (18.2%)
2020	1921	755 (40.4%)	1113	53	2.8%	26 (49.1%)	26 (49.1%)	1 (1.9%)	14 (26.4%)
2021	1744	655 (37.6%)	1031	58	3.3%	21 (36.2%)	31 (53.4%)	6 (10.3%)	16 (27.6%)
2022	1538	607 (39.5%)	892	39	2.4%	24 (61.5%)	15 (38.5%)	0 (0%)	17 (43.6%)
Total	9888	3768	5847	273	2.8%	115 (42%)	149 (54.6%)	9 (3.3%)	67 (24.5%)

and 1 patient out of 9 in the forceps group. However, none of the patients in the Kiwi group required blood transfusion. Though the incidence of blood transfusion in the forceps group seems high, it is not statistically significant due to the very low incidence of forceps delivery (Table 3).

On comparison of forceps delivery to vacuum delivery, it was observed that the birth weight of babies delivered using forceps was lower. This may be attributed to the reduced incidence of forceps delivery and the utilization of forceps specifically for delivering preterm babies before 34 weeks gestation. However, no significant differences were found among groups regarding NICU admission, Apgar scores, neonatal injuries, or jaundice (Table 4).

Among the cases of shoulder dystocia, which involved a total of eight babies, two babies experienced Erb's palsy, and one baby suffered a clavicle fracture along with Erb's palsy. All of these babies had a birth weight exceeding 3 kg, with three weighing more than 3.5 kg, and one weighing more than 4 kg. Among the eight cases of shoulder dystocia, six were born using the metal cup instrument and two using the Kiwi instrument. Additionally, three of the babies with shoulder dystocia were post-dated in their pregnancies. It is worth noting that all eight women involved in cases of shoulder dystocia were obese, with a BMI exceeding 30 kg/m², and one of them had a BMI greater than 40 kg/m².

DISCUSSION

In our study, the incidence of OVDs between January 2018 and December 2022 was determined to be 2.8% of total deliveries. Comparable international rates of OVDs range from 2 to 15%.⁵

Table 3: Maternal outcomes after operative delivery

	Kiwi	Metal	Forceps	Sequential use
3rd-degree tear	2 (0.7%)	10 (6.7%)	1 (11%)	0
Multiple vaginal lacerations	21 (18%)	31 (21%)	1 (11%)	3 (25%)
Cervical tear	4 (3.5%)	8 (5.3%)	0	1 (8%)
Sutured in OT	3 (2.6%)	7 (4.7%)	1 (11%)	2 (16%)
PPH	6 (5.2%)	8 (5.3%)	1 (11%)	1 (8%)
Need for blood transfusion	0	5 (3.4%)	1 (11%)	0

OT, operation theater; PPH, postpartum hemorrhage

Table 4: Neonatal outcomes after operative delivery

	Kiwi	Metal	Forceps
Mean birth weight	3070 ± 440	3119 ± 422	2341 ± 998
Apgar less than 7 at 5 min	1 (0.86%)	1 (0.67%)	2 (22%)
NICU admission	18 (15.7%)	28 (18.8%)	4 (44.4%)
RDS	8 (6.95%)	7 (4.7%)	2 (22%)
Cephalohematoma	2 (1.7%)	4 (2.7%)	0
Jaundice	10 (8.7%)	25 (16.7)	1 (11%)
Shoulder dystocia	2 (0.87%)	6 (4.6%)	0

observed over a 5-year period at our hospital, indicated a preference for Kiwi over metal cups.

In 2022, 68% of OVDs were performed using Kiwi, while 32% involved the use of metal cups. This trend was consistent with findings from a study conducted in Oman, where Kiwi was also the preferred instrument.⁶ In contrast, a study conducted at Singapore General Hospital reported a similar prevalence of both forceps and vacuum extractors for OVD cases.⁹ These variations in instrument preference highlight the influence of local practices and regional preferences on the choice of instruments for OVD.

During the past 5 years, there has been a notable increase in the use of epidural analgesia for instrumental deliveries. In 2018, 14.7% of instrumental deliveries were performed in women who received epidural analgesia, a proportion that has significantly risen to 43.6% in 2022. This observed increase in the utilization of epidural analgesia for instrumental deliveries is statistically significant. Previous studies have demonstrated a positive association between epidural analgesia and the incidence of OVD.¹⁴ The findings suggest that the availability and utilization of epidural analgesia may have contributed to the higher rates of instrumental deliveries observed in recent years.

Our study revealed a high rate of episiotomy, 86% of patients. This rate is significantly higher compared with a study conducted in Oman, where only 26.8% of patients received episiotomy.⁶ Furthermore, among the patients who underwent instrumental delivery, a total of 13 patients (4.7%) experienced third-degree perineal tears, with the majority of these tears occurring in cases involving the metal cup instrument (approximately 77%). This finding is not consistent with a study conducted at the University of Miami, which demonstrated a higher incidence of third and fourth perineal lacerations in forceps deliveries (20.0%) compared with vacuum deliveries (10.0%).¹⁵

In contrast, a study conducted in Oman reported a higher occurrence of perineal tears in the Kiwi instrument group.⁶ Additionally, 25% of our patients experienced multiple vaginal tears or cervical tear or both. The need for suturing in the operation theater was observed in 4.7% of cases, although this finding was not statistically significant. These findings underscore the importance of careful consideration and appropriate utilization of episiotomy and highlight the varying rates of perineal tears among different instrumental delivery methods.

Sequential instruments used in 12 patients (4.4%), majority of them were after failed kiwi. These findings are in line with a study conducted in London, which indicated that the success rate of Kiwi instrument usage is lower compared with conventional vacuum extraction.¹² Despite the fact that sequential instruments result in greater morbidity, our data found no maternal or newborn complications.

The mean birth weight of neonates delivered by vacuum extraction was approximately 3 kg, while those delivered by forceps had a mean birth weight of around 2.3 kg. Comparatively, neonatal birth weights in an Indian state of Uttarakhand ranged from 2.5 to 3.0 kg.¹⁶ Neonatal jaundice was observed in 13% of newborns in our study, and 18% of babies required admission to the neonatal unit and all babies discharged home in stable condition. In a study conducted in Oman, neonatal jaundice was seen in 6.9% of cases, and admission to the NICU was necessary in 6.6% of cases.⁶ Shoulder dystocia was found to be more common in vacuum-assisted deliveries, particularly when using the metal cup instrument. Consequently, vacuum-assisted births carry a higher risk of brachial plexus injury compared to forceps deliveries. This is comparable to study conducted in United states where shoulder dystocia was more common in vacuum-assisted group as compared to forceps.¹⁷

Overall, our study at Dubai Hospital suggest that the use of OVD in our hospital is associated with favorable outcomes for both mothers and infants.

Strengths and Limitations

The strengths of this study lie in its focus on obstetric outcomes and the examination of patterns related to operative vaginal birth, making it the only study of its kind conducted in Dubai, UAE in recent years. However, it is important to acknowledge the limitations inherent in the study design.

Additionally, the study lacks the ability to directly compare outcomes with full dilatation cesarean section, thereby limiting the comprehensive understanding of the topic. Furthermore, due to the retrospective nature of the study, data on failed instrumental deliveries were not available, which could have provided valuable insights into this aspect of obstetric care. It is essential to consider these limitations when interpreting the findings and extrapolating the results to other healthcare settings.

CONCLUSION

The rate of OVD observed in our study aligns with internationally accepted norms, demonstrating a judicious and appropriate utilization of this intervention. The expertise and skills of the operator, along with careful patient selection, play significant roles in ensuring the safety of instrumental delivery. Enhancing obstetrician training in instrumental delivery may hold potential to further reduce current CS rates. By fostering improved proficiency in OVD techniques, it is possible to offer more women the option of vaginal birth while maintaining optimal maternal and neonatal outcomes.

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