

Outcome of Assisted Vaginal Deliveries in a Tertiary Care Centre in Bengaluru

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ABSTRACT

BACKGROUND

The lower segment caesarean section (LSCS) audit shows an increase in caesarean section rates worldwide. Assisted vaginal delivery and, if needed, emergency caesarean section are options available to the obstetrician to handle challenges in the second stage when spontaneous and safe delivery is not imminent. Judicious use of the instrument as well as continuing medical education in the art of assisted vaginal delivery is a must to achieve the twin goal of containing the surging caesarean section rate as well as bring about a successful and safe assisted vaginal delivery. The objective of this study was to quantify the various morbidities associated with assisted vaginal deliveries among patients in a tertiary care teaching hospital in Bengaluru.

METHODS

It is a retrospective study carried for four years between July 2016 and June 2020 at Ramaiah Medical College at Bengaluru. The total number of vaginal deliveries was 6318 out of which 1020 had a successful assisted vaginal delivery and were studied in terms of outcomes, maternal and foetal indications and morbidity.

RESULTS

Out of 1020 assisted vaginal deliveries, 86.96 % were vacuum-assisted, 3.9 % were forceps assisted and 9.11 % were both vacuum and forceps assisted. The success rate of forceps deliveries was more compared to vacuum. No significant maternal and neonatal mortality and morbidity were observed in our study.

CONCLUSIONS

In this study, vacuum was the most used method of assisted vaginal delivery and was safer for mothers and babies. It is also easier to teach and learn. Forceps delivery was more used in preterm delivery.

KEY WORDS

Assisted Vaginal Delivery, Vacuum, Forceps, Sequential use of Instruments, Maternal and Neonatal Morbidity.

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BACKGROUND

Current obstetrics practice is witnessing an alarming increase in the rates of caesarean section. The art of assisted vaginal delivery is fading. The reasons are multifactorial and interrelated. The chief factors for this are the lack of adequate training and a fear of possible litigation in the face of neonatal / maternal morbidity. This creates a vicious cycle as the use of the instrument is potentially harmful in the hands of an inexperienced or imprudent obstetrician. Both the American College and the Royal College of Obstetricians and Gynaecologists continue to support the use of both vacuum and forceps. WHO suggests an overall section rate of up to 15 % to reduce maternal and neonatal mortality. WHO also says an increase in caesarean section rates beyond 15 % will not help much to reduce the maternal or neonatal mortality rates. The overall rate of caesarean section delivery has increased from 8.5 % in 2005-06 to 17.2 % in 2015-16. The overall rate of caesarean section in India, in 2015 according to The National Family Health Survey, was 17.2 %, with higher rates seen in some states and urban areas. These rates have increased to as high as 61 % in the NHFS-5 survey, in the year 2020 in the state of Telangana. However, the caesarean section rate is estimated to be low in North-eastern states and rural areas.^{1,2}

Labour brings its own challenges, in every stage. About 25 % of patients requiring intervention for a prolonged second stage of labour undergo an emergency caesarean section. Assisted vaginal delivery, with the use of forceps and / or vacuum extraction, offers the option to accomplish safe delivery for the mother and the foetus in the second stage, when expedite delivery is needed for mother / foetal condition and not possible immediately naturally, for some reason. A successful assisted vaginal delivery improves outcome and reduces the need for caesarean section and its attendant uterine scar and its implications for future pregnancy.

This art has its place in emergency obstetric care. Both the American College and Royal College of Obstetricians and Gynaecologists have laid down the pre-requisites to be met before the use of the instrument for assisted vaginal delivery to ensure maternal and neonatal safety. The words instrumental vaginal delivery, operative vaginal delivery and assisted vaginal delivery are used interchangeably in the literature. ACOG also guides us to introduce a discussion on the possible need for an instrument used during the delivery process, especially in primigravida beyond 32 weeks of gestation. Usually, the need to apply the instrument to facilitate delivery can be classified into 3 broad headings: (1) Foetal distress in the form of non-reassuring recurrent FHR decelerations (2) prolonged second stage of labour, arbitrarily, beyond 2 hours, and (3) maternal indication for assisted vaginal delivery in conditions like severe anaemia, maternal cardiac disease, eclampsia patient in labour etc. Successful use of assisted vaginal delivery requires a good understanding of the morbidities associated with the technique. In this paper, we wanted to quantify the outcome of the various morbidities associated with assisted vaginal deliveries among patients in a tertiary care teaching hospital.

METHODS

This is a retrospective study carried out for four years between July 2016 and July 2020 at M. S. Ramaiah Medical College and Hospital in Bengaluru. There were a total number of 6318 vaginal deliveries out of which 1020 had an assisted vaginal delivery and these patients were studied in terms of outcomes, maternal and foetal indications and morbidity. All assisted vaginal deliveries were conducted by a senior doctor on duty or by residents under supervision. Women attending the labour room were studied and evaluated in detail with proper history taking, clinical examination and relevant investigations. After case selection, verbal consent was taken, indication for instrument application documented and prerequisites fulfilled before instrument application. All mothers who gave birth successfully by assisted vaginal delivery were included in this study. In our setting, a reusable soft suction cup vacuum was used, and forceps deliveries were performed by application of the short curved low outlet forceps (e.g., Wrigley's Forceps). The vacuum was strictly not applied in pregnancies with GA < 34 weeks, and with caution in those between 34 and 36 weeks. The trial protocol was approved by the ethics committee of the institute. Maternal morbidity was studied in terms of cervical tears, major degree perineal tear, PPH. Neonatal morbidity was studied in terms of Apgar score, instrumental injuries, NICU admission and the outcomes were compared.

Inclusion Criteria

- Women in labour with vertex presentation with failed maternal forces in the second stage / maternal exhaustion.
- Multigravida with previous caesarean section or any other indication for forceps / ventouse delivery
- Patients with prolonged 2nd stage.
- Foetal distress or recurrent FHR decelerations in 2nd stage of labour
- Maternal conditions like eclampsia, severe pre-eclampsia, severe anaemia, cardiac disease.

Exclusion Criteria

- Cephalopelvic disproportion.
- Contracted pelvis.
- Deep transverse arrest (DTA).
- Two previous LSCS.
- Scar Thickness < 3 mm

Statistical Methods

The significance of differences between groups of study parameters measured on a categorical scale was quantified by the chi-square test.

RESULTS

Out of 1020 patients, 655 (64.2 %) received labour analgesia. 197 (19.2 %) received spinal analgesia and 458 (45.0 %) received combined spinal analgesia.

During the study period, there were a total of 6318 vaginal deliveries in our institution out of which 1020 (16 %) underwent successfully assisted vaginal deliveries. Out of 1020 assisted vaginal deliveries, 887 (86.96 %) were vacuum-assisted, 40 (3.9 %) were forceps assisted and 93 (9.11 %) both vacuum and forceps assisted.

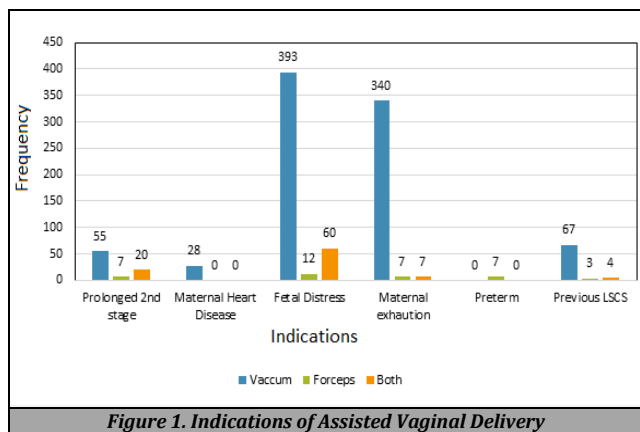
Out of 1020 assisted vaginal deliveries, 612 (60.9 %) were primigravida and 408 (39.1 %) were multigravida. In primigravida, vacuum use was the highest 523 (85.4 %) and forceps use was minimal 22 (3.5 %), both vacuum & forceps assisted were 67 (10.7 %). In multigravidas, use of vacuum was highest in 364 (89.2 %), forceps assisted were 18(4.4 %), and both vacuum & forceps assisted 26 (6.2 %). The chi-square test did not show any significant difference between the groups.

Out of 1020 patients, only 18 (1.8 %) cases of vacuum were seen below 20 years age group, no other instruments were seen. 860 (84.3 %) patients were in a group of 20 -30 yrs. age. Hence highest cases of assisted vaginal deliveries were seen in the same age groups. In 31 - 40 yrs. age group, 142 (13.9 %) patients were seen. The chi-square test did not show any significant difference between the groups.

| | | Vacuum (N = 887) | Forceps (N = 40) | Vacuum and Forceps (N = 93) | Total | P-Value |
|---------|-------|---------------------|---------------------|--------------------------------------|----------------|---------|
| Gravida | Primi | 523 (85.4%) | 22 (3.5%) | 67 (10.7%) | 612 (60.9%) | 0.59 |
| | Multi | 364 (89.2%) | 18 (4.4%) | 26 (6.2%) | 408 (39.1%) | |
| Age | <20 | 18 (100%) | 0 (0%) | 0 (0%) | 18 (1.8%) | 0.12 |
| | 20-30 | 791 (91.9%) | 29 (3.4%) | 40 (4.7%) | 860 (84.3%) | |
| | 31-40 | 78 (54.9%) | 11 (7.7%) | 53 (37%) | 142 (13.9%) | |

Table 1. Gravida and Age Distribution of Patients Studied in Relation to Instrument Application (P-Value < 0.05 for Chi-Square Test Indicate Non-Significance of Difference between Groups)

Out of 1020 women, the most common indication for instrument application was foetal distress 465(45.6 %). The second most common cause was maternal exhaustion 354(34.7 %). In the prolonged second stage of labour, use was 22 (8.3 %), prophylactic use of instruments to cut short the second stage of labour for maternal indication was 91 (9 %) which includes maternal heart disease 28 (3.1 %), previous LSCS were 74 (7.3 %), severe anaemia were 10 (1 %) and preterm were 7 (0.7 %).



Out of 1020 assisted vaginal deliveries, a total of 272 (27 %) maternal complications were noted. The complications were traumatic post-partum haemorrhage [(PPH) 113 (42 %)] and third-degree perineal tear 119 (43 %). The cervical tear was observed only in 27 (10 %) instances and fourth-degree in 13 (4.7 %) instances. A chi-square test resulting in a p-value of 0.056 showed a relatively significant difference in the complications between the groups. The numbers showed a larger incidence of traumatic PPH when the vacuum was applied and third-degree tear when forceps were applied.

| Complication | Vacuum | Forceps | Both | P-Value | Total |
|--------------------|----------------|---------------|---------------|------------------|-------------------|
| Third degree Tear | 79 (66.3%) | 16 (13.4%) | 24 (20.1%) | p value 0.056 | 119 (43%) |
| Fourth Degree Tear | 0 (0%) | 4 (30.7%) | 9 (69.2%) | | 13 (4.7%) |
| Cervical Tear | 26 (96.3%) | 1 (3.7%) | 0 (0%) | | 27 (10%) |
| Traumatic PPH | 102 (90.2%) | 0 (0%) | 11 (9.7%) | | 113 (42%) |
| Total | 207 | 21 | 46 | | 272 (100%) |

Table 2. Maternal Complications

| Complication | Vacuum | Forceps | Both | P-Value |
|-------------------------|--------------------|------------------|------------------|---------|
| Apgar score >6 at 1 min | 725 (90.2%) | 45 (75%) | 112 (73.2%) | 0.004 |
| Apgar score <6 at 1 min | 78 (9.7%) | 15 (25%) | 41 (26.8%) | |
| Total | 803 (78.7%) | 64 (6.3%) | 153 (15%) | |

Table 3. Neonatal Outcome - Apgar Score

Out of 1020 assisted vaginal deliveries, a total of 882 (86.5 %) were above 6 at 1 minute and 134 (13.1 %) were below 6 at 1 minute. The distribution was different for the different instruments as confirmed by the significant p-value for the chi-square test. The application of forceps seemed to have a detrimental effect on the 1 min Apgar score when compared with vacuum application. This difference could be partly explained by the GA < 34 weeks, in whom forceps were commonly applied.

| NICU Admissions | Vacuum | Forceps | Both | P-Value |
|-----------------|--------------------|------------------|------------------|---------|
| No | 645 (72.7%) | 29 (72.5%) | 62 (66.7%) | 0.18 |
| Yes | 242 (27.3%) | 11 (27.5%) | 31 (33.3%) | |
| Total | 887 (86.9%) | 40 (3.9%) | 93 (9.1%) | |

Table 4. Neonatal Outcome - NICU Admissions

Out of 1020 deliveries, 284 (27 %) were admitted to NICU, most of the babies were kept in NICU for observation (duration of < 6 hours). There was no statistically significant difference in the NICU admission rates for the different instruments as evidenced by the p-value of the chi-square test. Hence use of assisted vaginal delivery is safe in the hands of an experienced person.

DISCUSSION

In our study period, a total of 1020 patients (16 %) underwent assisted vaginal deliveries. We have considered vacuum as the first choice of instrument in all patients, but in preterm and the scenario of recurrent persistent foetal heart decelerations, forceps was the first choice of instrument used.

The vacuum was used in 86.9 %, forceps in 3.9 % and sequential use of vacuum & forceps was seen in 9.1 %. The use of vacuum in primigravida and multigravida was comparable, 85.4 % and 89.2 % respectively. Forceps use in multigravida was more, 4.4 % vs. 3.5 %. Assisted vaginal

deliveries were maximum in the age group of 20- 30 years 84.3 %, this corresponds to general reproductive age.

In the retrospective study done from January 2014 to January 2016 by Jabeen et al. in Pakistan, the rate of assisted vaginal deliveries was 4.7 %. Of these, 93.25 % were vacuum-assisted, while 4.7 % were forceps delivery. The average age of patients was between 22-26 years (63.75 %).

In the U.S, the rate of assisted vaginal deliveries was noted to be 3.1 % in 2015, but a wide range of distribution was noted between geographical areas, ranging from 1- 23 %.³

In the study done by Onoh et al. for 10 years between January 2003 and December 2012, the rate of assisted vaginal deliveries was 3.7 %. Forceps delivery was conducted in 0.5 % while vacuum delivery was conducted in 99.5 % of the assisted vaginal deliveries. There was no failed forceps delivery, but there were 11 (1.4 %) failed vacuum deliveries. The mean age of the patients was 27.0 ± 5.3 years with a range of 14 - 45 years. Vacuum delivery was a common mode of delivery among parturients of all age groups.⁴

A Cochrane review on an assisted vaginal delivery,⁵ showed that vacuum delivery almost replaced forceps delivery.⁶ Globally, more programmes promote vacuum extraction over forceps as more expertise is required for correct application of forceps while vacuum delivery requires less expertise, has less maternal complication but more foetal complications.

In a study conducted in the United States, the rate of assisted vaginal deliveries was 10 - 15 % which is comparable to our study.⁷ In our study, most common indication for assisted vaginal delivery was foetal distress, (45.6 %). The second most common cause was maternal exhaustion (34.7 %). Prophylactic use of instruments to cut short the second stage of labour was 9 %. In preterm use were 0.7 % and FGR 1.0 %.

In the study done by Hubena et al. the commonest indication was foetal distress (56.2 %) for assisted vaginal delivery among the 242 cases, and the second commonest was prolonged second stage of labour (24.0 %) and in 19.4 % assisted vaginal delivery was used to cut short second stage of labour.⁸

In the study done by Dhodapkar et al. at a tertiary teaching hospital in Puducherry, India, indications commonly seen in descending order were 1. Non-reassuring foetal heart rate was 45.3 %, 2. The prolonged second stage of labour was 33.9 %, and 3. Maternal indication to shorten the second stage of labour 13.1 %.⁹

In our study, 64 % of participants used labour analgesia. 280 (79 %) of the 354 women delivered for maternal exhaustion received labour analgesia.

In a study done by Jouppila et al. maternal exhaustion occurred due to narcotic interference, normal expulsive efforts due to suppression of the bear-down reflex was supposed to delay the second stage.¹⁰

Out of 465, 272 (59 %) women delivered for foetal distress received analgesia; distress may be due to maternal hypotension.

Cochrane Database studies showed that there was no statistical difference between combined spinal-epidural and epidural analgesia in risk for assisted vaginal delivery.

Labour analgesia is being used increasingly due to its potential benefit of shortening labour.¹¹

Wassen et al. study showed that the undesirable side effects of routing epidural analgesia include maternal hypotension and motor blockade.¹²

In our study, overall vacuum-assisted complications were 76 %, in which third-degree perineal tear was (38 %) and cervical tear was 12.5 %. Traumatic PPH was 49 % and no fourth-degree perineal tear was noted. Overall forceps assisted complications were 7.5 %, in which third-degree perineal tears were 76.1 %, fourth-degree tears were 19 % and no cervical tear and traumatic PPH were noted. Both vacuum and forceps delivery - 17.0 % complications noted in which third degree was 52.1 %, traumatic PPH 24 %, fourth-degree tear 19.5 %, no case of cervical tear seen. Overall, no significant difference was noted in both groups.

In the study done by Goetzinger et al. with 508 assisted vaginal deliveries an increased risk of episiotomy (90.5 vs. 81.8 %) and third and fourth-degree perineal lacerations (44.4 vs. 27.9 %) in the forceps groups were found when compared with the vacuum group. The risk of third-degree lacerations between the two groups showed no significant difference.¹³

The 1999 Cochrane systematic review showed that vacuum extraction was less likely to cause serious maternal morbidity (perineal and vaginal trauma) in comparison to forceps deliveries.¹⁴

In our study, neonatal complication was 13.1 % according to Apgar score of less than 6 at 1 minute and 33 (13.1 %) babies were admitted for 24 hours & more. Out of 33 babies admitted beyond 24 hours, two babies went for cooling therapy. 86.4 % of babies admitted to NICU for observation, were for the duration of fewer than 6 hours & later given back to respective mothers. Admission decision also depends on the preterm nature of babies or FGR babies or maternal complications like eclampsia and pre-eclampsia. Only one case was IUD at admission, for which forceps were used.

In a similar study by Prapas et al. assisted vaginal delivery 14.43 % of newborns required NICU admission.¹⁵

CONCLUSIONS

In this study, a vacuum cup was the most commonly used method for assisted vaginal delivery that was safer for both mother and baby. It is also easier to teach and learn. Forceps delivery was primarily used in preterm delivery and with the recurrent FHR deceleration in the second stage.

There is a scope for further reduction in caesarean section rates if a proper instrument is advocated. Proper judgment and decision for an assisted vaginal delivery are very important but not at the cost of maternal and foetal conditions. Hence training in the application of the instrument is very important to achieve a safe and successful vaginal delivery with less morbidity to mother and newborn.

Right time of intervention, the decision of the right instrument and correct technique lead to good maternal and foetal outcomes and a reduction in maternal and neonatal morbidity. A correct examination, judicious judgment and right techniques have brought many successful and safe vaginal deliveries. Assisted vaginal delivery should not be a lost art in modern obstetrics.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

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