

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20230790>

Original Research Article

Maternal and perinatal outcome in instrumental vaginal deliveries over 5 years: a retrospective study

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Received: 04 January 2023

Revised: 05 February 2023

Accepted: 01 March 2023

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ABSTRACT

Background: Due to fear of trauma and less skill, use of instrumental vaginal delivery (IVD) is decreasing every year and incidence of caesarean section is increasing. Caesarean section is a major surgery associated with increased morbidity and mortality. This study evaluates the incidence of instrumental vaginal delivery and associated maternal and perinatal outcome.

Methods: This observational retrospective study was carried out in full term antenatal patients in labour with vertex presentation who had undergone operative vaginal deliveries during the study period from January 2017 to December 2021 at G.C.S. Hospital. Data were obtained from the hospital records and analysed which included the age, parity, incidence, indication, the APGAR scores of the babies and complications in the patient.

Results: Incidence of instrumental deliveries was found to be 1.98%. Most common indications for IVD were prolonged second stage of labour followed by foetal distress and post-dated pregnancy. Most common maternal complication was perineal tears and most common perinatal complication was neonatal intensive care unit (NICU) admission.

Conclusions: The decision to proceed with an operative vaginal delivery when a spontaneous vaginal delivery is not possible must be based upon maternal and foetal factors. Most common maternal complications were perineal tears, cervical tears, episiotomy extension, vaginal laceration and atonic postpartum hemorrhage (PPH). Most common neonatal complications were NICU admission most commonly for neonatal hyperbilirubinemia.

Keywords: Instrumental vaginal delivery, Forceps, Vacuum, Perinatal outcome, Maternal complications

INTRODUCTION

Instrumental vaginal delivery is defined as vaginal delivery accomplished with the aid of instruments which can be vacuum or forceps. It is carried out for maternal interest, foetal interest or both. It is a procedure with a long history spanning more than two centuries for forceps delivery and more than one century for vacuum delivery. Both have undergone modifications and refinement to the present day. According to the World Health Organization (WHO) and the United Nation (UN) Agencies, Assisted vaginal delivery is one of the seven critical functions of basic emergency obstetric and newborn care (BEmONC).¹ So it is very important to realise the fact that instrumental

vaginal delivery procedures should be made available and accessible everywhere especially in low and medium resource countries including India where the need is high and caesarean section as alternative is not always available.

The choice of which instrument to use varies from locality to locality and depends on the perception of practitioners on the relative safety of the instruments and their experiences. In some areas it depends on the availability of the instruments and the skill of the attending doctor.

In order to determine the incidence and indications of IVD at GCSMCH and RC Ahmedabad, Gujarat and to compare

the foetal and maternal outcomes of vacuum and forceps deliveries, we studied the outcomes of the procedures over a five-year period extending from 2017-2021 at Gujarat Cancer Society Medical College and Hospital, Ahmedabad.

METHODS

Study type

It was an observational retrospective study.

Study place

The study was conducted at the Gujarat Cancer Society Medical College and Hospital, Ahmedabad, Gujarat, India.

Period

The duration of the study was from January 2017 to December 2021.

Selection criteria of the patients

Full term antenatal patients in labour with vertex presentation who had undergone operative vaginal deliveries with the help of forceps or vacuum were included.

Procedure

This was a retrospective study carried out including all patients that had IVD between January 2017 and December 2021. 176 instrumental deliveries were included in this study. Data were obtained from the hospital records which included the age, parity, incidence, indication, the APGAR scores of the babies and complications in the patient and studied.

Statistical analysis

No statistical analysis method was used.

RESULTS

During the study period there were total of 8874 deliveries in our institution out of which 176 cases had undergone instrumental vaginal delivery. Out of 176 instrumental deliveries, 135 were forceps assisted (76.70%) and 41 were vacuum assisted (23.29%). The incidence of instrumental deliveries at our institution was 1.98%. In a study carried out in United States, vacuum extraction and forceps delivery accounted for 7.6% and 3.2% of total deliveries in US in 1998 respectively.

Table 2 shows that majority of women were young between 25-29 years accounting for 45.45% followed by 20-24 years accounting for 44.88%. The highest number of cases of forceps assisted delivery were in the age group

of 20-24 years. And the lowest number were in the age group of above 15-19 years.

Table 3 shows that most patients that underwent vacuum or forceps delivery were primigravida patients (81.25%) followed by those with parity two (15.34%). 65.90% of primigravida patients were forceps delivered and 15.34% were vacuum delivered. 4 patients had parity two and 2 patients had parity three. 81.25% cases were primigravida followed by second gravida accounting for 15.34% cases.

Table 4 shows that 93.18% of instrumental deliveries were carried out in term patients followed by 5.68% in post term patients. Among preterm mothers, one forceps delivery took place and one vacuum delivery.

Table 5 shows that outlet forceps delivery was most commonly performed accounting for 74.81% followed by low forceps, which accounted for 22.96% of total deliveries. Mid Cavity forceps was performed in 3 patients out of 135 forceps deliveries accounting for 2.22%.

In 74.43% of the participants, the indications for instrumental delivery were prolonged second stage of labour as given in Table 6. Maternal heart disease was the indication in 1 out of 176 instrumental deliveries.

Table 7 shows that the greatest number of instrumental deliveries were carried out in babies with birth weight between 2600 to 3000 gms accounting for 55.68%. Out of these 39.2% of the babies were born through forceps delivery and 16.47% were delivered through vacuum vaginal delivery. The second largest group delivered through instrumental delivery had birth weight between 3100 to 3500 gms which accounted for 29.54% of total deliveries.

Table 8 shows that most common maternal complication was Perineal tear which was seen in 17.04% of total deliveries out of which 14.77% were seen in forceps delivery and 1.70% in vacuum delivery. Out of perineal tears, most common was second degree perineal tear which was seen in 15.90% deliveries. Second most common complication was Cervical tear which was seen in 12.50% of total deliveries out of which 10.79% were seen in forceps delivery and 1.70% in vacuum delivery. Other complications were episiotomy extension and vaginal laceration. Atonic PPH was seen in 9 patients. Traumatic PPH was seen in 3 patients with cervical laceration which was managed by prostaglandins with suturing of tears and intravenous oxytocin drip. Blood transfusion of 1 PCV was given in each.

NICU admission was seen in 27.84% of total delivered babies out of which 23.29% were forceps delivered and 4.54% were vacuum delivered. 12.50% of delivered babies developed hyperbilirubinemia and were taken to NICU for phototherapy out of which 11.36% were forceps delivered babies. 2 babies had instrumental marks and bruising, 2 babies developed cephalhematoma and 2 babies had

episodes of convulsions due to hypoxic- ischemic encephalopathy. No babies developed subconjunctival hemorrhages. Clavicle fracture was noted in 1 baby following forceps application because of shoulder dystocia which was managed conservatively with the help of orthopaedic surgeons by splinting the shoulder for 4 weeks. 2 babies had birth asphyxia out of total 143 delivered babies (1.13%).

Table 10 shows that APGAR score was more than 6 in 80.11% of total instrument delivered babies out of which 59.09% were forceps delivered and 21.02% were vacuum delivered. APGAR score was less than 6 in 19.31% of total instrument delivered babies out of which 17.04% were forceps delivered and 2.27% were vacuum delivered. One still birth was seen in a patient which was possibly due to severe fetal distress and tight loop of cord around neck seen at birth.

Table 1: Incidence of instrumental vaginal delivery.

Total number of deliveries from January 2017 to December 2021	Types of instrumental vaginal delivery		Total number of instrumental vaginal deliveries	Incidence (forceps+vacuum)
	Forceps delivery	Vacuum delivery		
8874	135	41	176	1.98%

Table 2: Maternal age of the patient.

Age (years)	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
15-19	1	0.56	1	0.56	2	1.13
20-24	63	35.79	16	9.09	79	44.88
25-29	58	32.95	22	12.5	80	45.45
30-34	13	7.38	2	1.13	15	8.52
Total	135	76.70	41	23.29	176	

Table 3: Parity.

Parity	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
0 (Primi)	116	65.90	27	15.34	143	81.25
1	16	9.09	11	6.25	27	15.34
2	2	1.13	2	1.13	4	2.27
3	1	0.56	1	0.56	2	1.13
4 or more	0	0	0	0	0	0
Total	135	76.70	41	23.29	176	

Table 4: Gestation age wise distribution.

Gestational age (weeks)	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
<37 (pre term)	1	0.56	1	0.56	2	1.13
37-40 (term)	127	12.15	37	21.02	164	93.18
>40 (post term)	7	3.97	3	1.70	10	5.68

Table 5: Types of forceps.

Outlet Forceps		Low forceps		Mid cavity forceps		Total
Number	%	Number	%	Number	%	
101	74.81	31	22.96	3	2.22	135

Table 6: Indication of application.

Gestational age (weeks)	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
Fetal distress	26	11.47	7	3.97	33	18.75

Continued.

Gestational age (weeks)	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
Prolonged second stage	98	55.68	33	18.75	131	74.43
Post term pregnancy	7	3.97	1	0.56	8	4.54
Poor maternal effort	2	1.13	-	-	2	1.13
Preterm/twins	1	0.56	-	-	1	0.56
Heart disease	1	0.56	-	-	1	0.56
Total	135		41		176	

Table 7: Birth weight of neonate.

Birth weight (kgs)	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
2-2.5	16	9.09	3	1.70	19	10.79
2.6-3	69	39.20	29	16.47	98	55.68
3.1-3.5	44	25	8	4.54	52	29.54
3.6-4	5	2.84	1	0.56	6	3.40
>4	1	0.56	-	-	1	0.56
Total	135	76.70	41	23.29	176	

Table 8: Immediate maternal complications in instrumental vaginal deliveries.

Complications	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
Episiotomy extension	17	9.65	3	1.70	20	11.40
Perineal tears	26	14.77	4	2.27	30	17.04
Total	24	13.63	4	2.27	28	15.90
2 nd degree	2	1.13	-	-	2	1.13
Vaginal laceration	12	6.81	2	1.70	14	7.95
PPH traumatic	2	1.13	1	2.27	3	1.13
PPH atonic	9	5.11	-	1.70	9	5.68
Vaginal hematoma	1	0.56	-	2.27	1	0.56
Cervical tear	19	10.79	3	1.70	22	12.50
Increased length of hospital stays	9	5.11	-	2.27	9	5.11

Table 9: Immediate neonatal morbidity/complications in instrumental vaginal deliveries.

Complications	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
NICU admission	41	23.29	8	4.54	49	27.84
Instrumental marks and bruising	2	1.13	-	-	2	1.13
Neonatal hyperbilirubinemia and need for phototherapy	20	11.36	2	1.13	22	12.5
Cephalhematoma	2	1.13	-	-	2	1.13
Intracranial USG done and abnormality detected	1	0.56	-	-	1	0.56
Convulsions	2	1.13	-	-	2	1.13
Orthopedic injuries	1	0.56	-	-	1	0.56
Birth asphyxia	2	1.13	-	-	2	1.13

Table 10: Neonatal APGAR score and mortality.

APGAR	Forceps delivery		Vacuum delivery		Total	
	Number	%	Number	%	Number	%
APGAR at 1 minute >6	104	59.09	37	21.02	141	80.11
APGAR at 1 minute <6	30	17.04	4	2.27	34	19.31
Still birth	1	0.56	-	-	1	0.56
Total	135		41		176	

DISCUSSION

The incidence of instrumental vaginal delivery at our institute was 1.98%. Previous studies show it to be between 10% and 15% in the UK and 4.5% in the United States.³ Because of less skill and risk of maternal and neonatal injuries, IVDs are underused in low resource settings.⁴ In the study carried out in Nigeria by Aliyu et al observed incidence of instrumental vaginal delivery 0.69%.⁵ Incidence ranges from 1% in Niamey (Niger) and Bamako (Mali) to 3% in Nouakchott (Mauritania).⁶

Out of all mothers, 143 (81.25% cases) were primigravida followed by second gravida being 27 (15.34% cases). Aliyu et al observed that primigravida were 52% and second gravida were 18% of total IVDs.⁵ Prapas et al also observed primigravida forming 85% and multigravida 15% cases among instrument delivered.⁷ Aliyu et al also observed that women upto 25 years of age formed 62 % of cases.⁵

In our study, the most indication for instrument application was prolonged second stage of labour in 74.43% cases followed by foetal distress in 18.75% cases. Maternal heart disease accounted for 0.56% cases. In a study by Singh and Rathore, the indication for instrument application was foetal distress in 20.83% and prolonged second stage in 16% cases.⁸ Prapas et al observed most common indication for IVD as prolonged second stage of labour in 69.73% followed by foetal distress accounting for 26.47%.⁷ Hence, operative vaginal deliveries should be performed only if there is an appropriate indication.

Maternal complications in our study due to forceps applications causing perineal tears accounted for 17.04% cases followed by cervical tear in 12.5% cases. Episiotomy extension was found in 11.40% cases. The incidence of episiotomy extension was 26.66% in study by Singh and Rathore.⁸ Over 50000 vaginal deliveries at the University of Miami were reviewed where it was observed that the rate of 3rd and 4th degree perineal lacerations were significantly higher in forceps (20%) and vacuum (10%) as compared to the spontaneous vaginal delivery.⁹ In study by Bradley et al the rate of severe vaginal lacerations was approximately 32% and that by Handa et al showed incidence of vaginal laceration to be between 20-50%.^{10,11} The study by Sultan et al also showed similar results.¹²

In our study 27.84% newborn babies required NICU admission and 12.5% of babies had neonatal Jaundice.

Prapas et al in their study on IVD showed that 14.43 % newborn required NICU admission.⁷

80.11% of the newborn had a good APGAR score >6 at 1 min. Evidence evaluating neonatal morbidity after instrumental vaginal delivery is inconsistent.¹³ A Cochrane database systematic review of 10 trials compared vacuum extraction with forceps delivery and found no significant differences in APGAR scores at one and five minutes, few serious injuries in neonates and an increase in cephalhaematoma and retinal haemorrhage associated with vacuum extractor.¹⁴ In a recent prospective by Murphy et al it was found that neonatal trauma and fetal acidosis were more common after failed instrumental vaginal delivery than after immediate caesarean section.¹⁵

Limitations

In our study controls were not taken. Long term maternal and neonatal outcomes were also not studied in the study.

CONCLUSION

The impact of chosen method of delivery on future modes of delivery is of vital importance in modern obstetrics. One of the leading factors in global rise of caesarean section is primarily the caesarean section itself. There is need to minimize the same to have a noticeable effect on overall rate of caesarean section worldwide. As per the present study, it can be concluded that the decision to proceed with an operative vaginal delivery must be based upon maternal and foetal factors and the risks and benefits of both the modes of IVD must be individualised in each scenario. So, it is very important to reinvent the training and use of operative vaginal delivery so as to optimise this art which is underutilised today. When it is performed by skilled provider it is an ideal alternative to the caesarean delivery in the chosen patients.

ACKNOWLEDGMENTS

Authors would like to thank Dr. Kirti Patel (Director), Dr. Yogendra Modi (Dean) and Dr. Bhandaru Sridhar (Medical Superintendent) of Gujarat Cancer Society Medical College, Hospital and Research Centre. They are also thankful to Dr. Himani Yadav and incharge nurse, Nilam Mahida.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Ghanchi FM, Mansuri MI, Doshi HU, Patel PHK. Maternal and perinatal outcome in instrumental vaginal deliveries over 5 years: a retrospective study. *Int J Reprod Contracept Obstet Gynecol* 2023;12:934-9.