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Original Research Article

A retrospective observational study to assess the maternal and neonatal outcomes with instrumental delivery in tertiary care hospital

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ABSTRACT

Background: In modern obstetrics, the number of vaginal deliveries is reducing, and instrumental delivery are still reduced. This could be due to need for obstetrician skill for instrumental delivery, increased perineal tears or foetal injuries. The objective of this study was to assess the maternal and neonatal outcomes with instrumental delivery.
Methods: This is a retrospective observational study conducted in tertiary care hospital from January 2023 to December 2023. In this study, 31 cases of forceps delivery and 15 cases of vacuum were studied for maternal and neonatal outcomes.
Results: The total number of deliveries were 2693 and vaginal deliveries were 999 and instrumental deliveries were 46. It was observed that most patients (86.9%) requiring instruments in the second stage were primigravida. The most common indication for instrumental delivery is both fetal distress and poor maternal bearing down efforts. The maternal complications were more with forceps and included extension of episiotomy in 5 cases, third degree perineal tear in 6 cases, 2 cases of hematoma- one case of broad ligament hematoma and 2 patients required blood transfusion. The neonatal complications were more with forceps. However, the outcomes were favourable. We did not have any case of HIE stage 3, no baby required intubation. 3 babies with forceps had poor Apgar at birth and HIE stage 1.
Conclusions: Instrumental delivery is relatively a safe and good option provided all the criteria are met. With proper technique, we can reduce the maternal complications as well.

Keywords: Forceps, Instrumental delivery, Vacuum

INTRODUCTION

In modern obstetrics, it is observed that the use of instrumental delivery is decreasing. With need for skill and fear of increased risk maternal and fetal morbidity and mortality with use of instruments obstetricians are now preferring caesarean section. The rates of caesarean section are increasing.[1] It is important to study the outcomes and improve training among residents and practicing obstetricians to alleviate fear of instrumental delivery. This study was conducted in tertiary care hospital to assess the maternal and fetal outcomes of instrumental delivery.

METHODS

This retrospective observational study was conducted over a period of one year from January 2023 to December 2023 in Kasturba medical college, Manipal. The total number of deliveries in the year 2023 was 2693. The number of vaginal deliveries were 999. The total number of instrumental deliveries were 46 (4.6% of total vaginal deliveries). The number of forceps delivery were 31(67.3% and the number of vacuum deliveries were 15 (32.6%).

Inclusion criteria

Inclusion criteria included singleton foetus, vertex presentation, those fulfilling criteria outlet forceps and vacuum delivery. Episiotomy was given as routine.

Demographic details such as age, BMI, gestational age, parity was studied. Type of labour and obstetrics characteristics like medical disorders in pregnancy were also included. Labor characteristics included cadre of obstetrician, position, type of analgesia, cord around neck. Indication for instrumental delivery were divided into fetal distress, poor maternal bearing down efforts, both, prolonged second stage and to cut short second stage. The maternal complications studied were extension of episiotomy, degree of perineal tear, paraurethral tear, cervical tear, postpartum hemorrhage, women requiring blood transfusion, vaginal hematoma, urinary retention, delayed wound healing and secondary suturing. The neonatal outcomes studied were cry at birth, birth weight, Apgar scores, perinatal asphyxia, NICU admission and complications and facial injuries. The statistical tool employed was mean and t -test for comparison.

RESULTS

Among the demographic variables, most of the patients belonged to age group of 20-30 years. Majority of them had normal BMI and 86.9% were primigravida. Instrumental delivery was applied in term pregnancies and there were 2 cases of preterm forceps (34-36weeks). Among 46, 25 were spontaneous labour and 21 patients were induced. There were 9 cases of GDM and one requiring insulin (Table 1, 2).

Table 1: Demographic variables.

Patient characteristics		Number (n=46)	Percentage
Age (years)	20-30	31	67.39
	30-40	15	32.60
BMI (kg/m^2)	18-25	30	
	25-30	9	
	Above 30	3	
Parity	Primipara	40	86.9
	Multipara	6	13
	VBAC	1	

In the labour characteristics cadre of obstetrician, position, type of analgesia and cord around neck were studied as described in table below. Most favorable position for instrumental delivery is occipitoanterior position (Table 3, 4).

In our study most common indication for instrumental delivery was both fetal distress and poor maternal bearing efforts (Table 5).

Table 2: Obstetrics characteristics.

		Number (n=46)
Gestational age	<34	0
	34-36+6	2
	37-39+6	36
	40-41	8
Spontaneous labor		25
Induced		21
Diabetes (all were GDM)	Diet	7
	OHA	1
	Insulin	1

Table 3: Labour characteristics.

		Forceps (n=31)	Vacuum (n=15)
Cadre of obstetrician	Senior resident (53.84%)	4	0
	Assistant professor	18	5
	Associate professor and professor	9	10
Position	OA	21	15
	OP	10	0

Table 4: Labour characteristics.

Type of analgesia	Local	Forceps (n=31)	Vacuum (n=14)
	Epidural	**0**	**1**
Cord around the neck		5	1
Shoulder dystocia		0	0

Table 5: Indications.

	Forceps (n=31)	Vacuum (n=15)
Fetal distress	4	4
Poor bearing down efforts	8	5
Both	17	7
Prolonged second stage	2	1
To shorten second stage	0	0

Maternal complications were more associated with forceps delivery - there were 5 cases with extension of episiotomy, 6 cases of 3rd degree perineal tears, 2 cases of paraurethral tear, one case of cervical tear, one traumatic PPH, 3 cases of mild atonic PPH with forceps and 4 mild atonicity with vacuum. There were 2 cases of hematoma with forceps - one vaginal hematoma and one more broad ligament hematoma which was managed conservatively. One case required secondary suturing (Table 6).

Neonatal outcomes showed that mean birth weight 3,2 kgs with forceps and 2.8 kgs with vacuum. 74% babies had normal cry with forceps and 93% had normal cry with vacuum. 3 babies with forceps and 2 babies with vacuum had HIE stage 1, recovered. No cases required intubation or no cases of HIE stage 3 was seen. There were no facial injuries/scalp cephalohematoma with instruments (Table 7).

Table 6: Maternal complications.

	Forceps (n=31)	Vacuum (n=15)
Extension of episiotomy	5	1
Perineal tear 1st -2nd degree	0	1
3rd degree	6 (19.3%)	0
Paraurethral tear	2	0
Cervical tear	1	0
PPH	3 1- traumatic PPH	4
Women requiring blood transfusion (none of them were anemic prior to delivery)	2	0
Urinary retention/incontinence	0	0
Delayed wound healing	0	0
Secondary suturing	1	0
Vaginal hematoma	1 1-broad ligament hematoma	0

Table 7: Neonatal outcomes and complications.

		Forceps (n=31)	Vacuum (n=15)
Cry at birth	Normal	23 (74.1%)	14 (93%)
	Weak	4	0
	On stimulation	0	1
	After BMV/PPV	4	0
	Intubated	0	0
Birth weight (kg)	Less than 2.5	0	1
	2.5-3	11	7
	3-3.5	16	4
	Above 3.5	4	3
Mean birth weight	(kg)	3.2	2.8
Perinatal asphyxia	HIE 1 (perinatal depression)	3	2
	HIE 3	0	0
APGAR 1 min	2-6	3	2
	7-9	24	13
NICU admissions		4 (1-step down)	**3**
Birth injury/facial injury		0	0

DISCUSSION

In this study we observed that the instrumental delivery accounted to 4.6% of the total vaginal deliveries. It was seen most of the patients (86.9%) requiring instruments in the second stage were primigravida. The most common indication for instrumental delivery in our hospital is both fetal distress and poor maternal bearing down efforts (52.7%). In a prospective study conducted by Archana et al, it was seen that among 158 forceps delivery, 76% requiring forceps were primigravida and the most common indication was fetal distress.[1]

The observed maternal and neonatal complications were higher for forceps assisted vaginal delivery compared to a ventouse. Episiotomy related complications are notably associated with forceps delivery (10.8%). There were 6 cases of 3rd degree perineal tear with forceps (19.3%) which had primary suturing and recovered. In a study conducted by Shekhar et al, they observed higher incidences of maternal trauma with forceps delivery especially with extension of episiotomy and anal sphincter tear.[2]

In a study Aiat et al, describes how unnecessary caesarean section is associated with increased with maternal and perinatal morbidity. They tell instrumental delivery can help in reducing c section rates. However, he describes that the complications associated with operative vaginal delivery are dependent on case selection and the level of the experience of the obstetrician.[3]

In a study conducted by Singh et al, 70 cases of forceps and vacuums each were studied. It was observed that maternal trauma in terms of periurethral tear, second- and third-degree perineal tear were significantly more in forceps group. The neonatal outcomes were similar.[4]

In study conducted by Akhtar et al, retrospective study of 304 instrumental delivery was conducted, out of which 258 were ventouse and 46 were forceps deliveries. 70% of forceps deliveries were carried out in primigravida. Foetal

distress was indication in 80% vacuum deliveries. They observed that extension of an episiotomy was more likely to occur with ventouse than forceps deliveries while 3rd degree perineal tears occurred more with forceps deliveries.[5]

In the study conducted by Johnson et al, retrospective study of 508, 200 were forceps and 308 were vacuum. It was observed that there was a higher rate of epidural and pudendal anesthesia, episiotomies, maternal third- and fourth-degree perineal and vaginal lacerations with the use of forceps, whereas periurethral lacerations were more common in vacuum-assisted deliveries.[6]

In a study by Nkwabong et al among 3623 vaginal deliveries, 2.3% instrumental deliveries were conducted. It was seen that maternal complications were minor and foetal outcomes were good. They feel that instrumental delivery should be encouraged and taught to reverse the rising caesarean section rate.[7]

Nina Philip and others from Punjab conducted a 2-year retrospective study on forceps-rejuvenating a dying art. They studied 156 cases of forceps. It was seen that forceps were relatively safe and effective instrument that can reduce unnecessary caesarean sections.[8]

In study by Kovavisarach et al it was observed that the maternal complications (third and fourth degree of perineal tear and postpartum haemorrhage) were statistically significant more often in the forceps group than in the vacuum extraction group. But foetal complications (neonatal hyperbilirubinemia, low Apgar scores (< 7) at 1 and 5 minutes and the transfer to NICU) were statistically significant more often in the vacuum extraction group than in the forceps group.[9]

Lamba et al conducted an observational study in government hospital in India. They studied 70 cases of forceps .68.5% of patients requiring forceps application were primigravida. The most common indication was foetal distress (54.2%) followed by maternal exhaustion. The most common maternal complication was extension of episiotomy, 1 case of uterine rupture which was in a previous lower segment caesarean section case, 2 complete perineal tears, 3 cases of vaginal and cervical lacerations.[10] Postpartum haemorrhage requiring blood transfusion occurred in 4 cases. A total of 19 babies had poor Apgar scores and 9 of them needed NICU admission. There were 3 cases of still births and 2 of early neonatal deaths.[10]

Vincent conducted a studied to know the trends of instrumental delivery and maternal and foetal factors with successful and failed trials. It was seen that among 114 trials, 82 was successful thus reducing caesarean section rate.[11] ACOG bulletin also suggests that operative vaginal birth is an important component of modern labour management and it is important that obstetrician familiarises with proper use and risks.[12]

There was one case of broad ligament hematoma with forceps which was managed conservatively, and the patient required a 3-pint blood transfusion. There was one more case of traumatic postpartum hemorrhage and hypovolemic shock where patient required 8 PRBC, 5 FFP, 9 CRYO, 5 RDP and had undergone emergency B/L uterine artery embolization and right ovarian artery embolization and patient finally recovered and was discharged on postnatal day 11.

In a study by Caughey et al they observed that the vacuum-assisted vaginal birth is more often associated with shoulder dystocia and cephalohematoma while Forceps delivery is more often associated with third- and fourth-degree perineal lacerations.[13]

Lucky et al did a comparative study between operative and spontaneous delivery. They found that foetal scalp bruises and caput succedaneum was higher for operative vaginal delivery. They concluded operative vaginal delivery by experienced healthcare providers is associated with good obstetric outcomes with minimal risk.[14]

In a study by Lurie, compared maternal and neonatal effects of forceps and vacuum delivery and found no significant difference between both modes of delivery.[15]

In a study conducted by Kitaw et al risk of neonatal and infant adverse outcomes between vacuum and forceps was done. It was seen that Vacuum delivery was associated with a lower risk of birth injuries, neonatal seizures and need for assisted ventilation. The risks of intracranial haemorrhage, difficulty with feeding, and retinal haemorrhage were comparable between both modes of delivery.[16]

In a study by Kaur et al it was observed that forceps delivery had a total of 19 babies had poor Apgar scores and 9 of them needed NICU admission. There were 3 cases of still births and 2 of early neonatal deaths.[17]

In our study, 15.2% of the neonates required NICU admissions for 1-4 days depending on the morbidity. However, there were no facial/scalp injuries, no neonate required intubation and there was no case of HIE stage 3.

This study has few limitations. In most of our cases in second stage of labour women are exhausted. They invariably have poor maternal bearing down efforts. It was difficult to ascertain exact indication for instrument delivery as fetal distress or poor maternal bearing efforts. Among instrumental delivery there is an unequal distribution between forceps and vacuum delivery. Hence, we cannot really tell which instrument is safer and more superior.

CONCLUSION

Instrumental delivery is relatively a safe and good option in cases of poor maternal bearing down and fetal distress

provided all the criteria are met. With proper expertise and judicious use, we can reduce the maternal complications as well.

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