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A prospective observational study to evaluate the maternal and neonatal outcome of forceps delivery in a tertiary care government hospital

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Abstract

Introduction: The art of forceps delivery is a practice that dates back several centuries. Modern obstetrics practice has witnessed an increase in the caesarean section rates. The goal of forceps delivery is to mimic spontaneous vaginal birth, thereby expediting delivery with a minimum of maternal or neonatal morbidity. Its safe and proper use can reduce the rising caesarean section rates. This study is aimed to see the outcome of its use in a teaching hospital over a 1 year period.

Materials and Methods: In this Prospective observational study, 158 cases of forceps delivery were studied for maternal outcome such as injuries, failure of forceps, postpartum hemorrhage, need of blood transfusion and neonatal outcome such as birth weight, Apgar scores, neonatal intensive care unit admissions or any fetal morbidity or mortality.

Results: Out of the 158 patients, 76.58% of patients requiring forceps application were primigravida. The most common indication was fetal distress (55.69%) followed by maternal exhaustion. The most common maternal complication was maternal injuries such as vaginal lacerations. (9.49%), 3 cases of failure of forceps delivery (1.89%), vulvovaginal hematoma in 2 cases, 6 cases of complete perineal tears with 6 cases of Postpartum hemorrhage requiring blood transfusion. There was 1 case of uterine rupture which was in a previous lower segment caesarean section case. Out of total of 15 babies (9.49%) who had poor Apgar scores 14 recovered after resuscitation with 1 case of stillbirth where fetal distress was indication of forceps delivery.

Conclusion: Forceps is a considerable and safe option for the obstetrician to reduce the caesarean section rates; however, extreme caution, proper expertise and judicial use of this instrument is required to prevent undue risk to mother and fetus.

Keywords: Forceps delivery, caesarean section

Introduction

Forceps has been an integral part of obstetrician's armamentarium since its introduction by Chamberlain family centuries ago [1]. It has undergone numerous modifications and has evolved into its present form [2]. This art of instrumental delivery, though has benefited many, has also led to numerous litigations due to associated fetal and maternal morbidity leading to reluctance in its use [3, 4] Although several authors have reported the relative safety of forceps delivery many obstetricians have abandoned the use of this intervention [5]. Today, there is a concern about the dramatically rising rates of caesarean delivery worldwide [6]. Non indicated caesarean sections are associated with increased maternal and perinatal morbidity [7]. Thus a better understanding of outcome of mother and neonate will help to remove the prejudice against the instrument. This study is to evaluate the outcome of its use in a teaching institution over a 1-year period.

Materials and Methods

This is a prospective observational study conducted over a period of 1 year from May 2019 to April 2020 at a tertiary care government hospital in Mumbai. Out of total 9704 deliveries carried out at our institution, all cases of forceps deliveries were included, a total of 158.

Inclusion Criteria: a). Singleton fetus b). Vertex presentation c). Consenting to participate in the study d). Those fulfilling criteria for outlet forceps delivery according to ACOG (2003)8:

- Outlet Fetal scalp visible without separating the labia
- Fetal skull has reached the pelvic floor.
- Sagittal suture is in the antero-posterior diameter or right or left occiput anterior or posterior position (rotation does not exceed 45°)
- Fetal head is at or on the perineum

Exclusion criteria: a). Contraindication for vaginal delivery b). Those not fulfilling the inclusion criteria

The forceps used was Wrigley's outlet forceps. Cases were scrutinized for demographic data, gestational age and parity. Various indications for instrumental delivery were noted. Perineal infiltration (with lignocaine) with left mediolateral episiotomy was done as a routine. Maternal outcomes of interest were genital tract injuries, extended episiotomy, postpartum hemorrhage. Neonatal outcomes of interest were birth weight, apgar scores, NICU admission and other comorbidities.

Results

Sociodemographic Profile

A total of 158 cases were studied. Sociodemographic profile of the cases is shown in Table 1. The mean age of the patients was 26.8 years. Total 121 patients were primigravida and 37 were multigravida. Among gestational age group, 31.64% of patients requiring this intervention had crossed the gestational age of 40 weeks.

Table 1: Sociodemographic profile

Characteristics	Groups	Number	Percentage
Age (years)	<20	11	6.96
	20-30	121	76.58
	>30	26	16.46
Total		158	100
Characteristics	Groups	Number	Percentage
Parity	Primi	121	76.58
	Multi	37	23.42
Total		158	100
Gestational Age	<37	20	12.66
	37-40	88	55.70
	>40	50	31.64
Total		158	100

Indications of forceps application

Table 2 shows the indications of forceps application. The figures reveal that the most common indication for application of forceps was non-reassuring fetal heart rate (55.69%) followed by maternal exhaustion (21.52%), failure of descent of head (15.19%) and to cut short second stage of labour (7.6%).

Table 2: Indications of Forceps application

Indication	Number	Percentage
Non reassuring fetal heart rate	88	55.69
Maternal Exhaustion	34	21.52
Prolonged second stage	24	15.19
Cut short second stage of labour	12	7.60
1.Previous LSCS	3	1.91
2. Eclampsia	5	3.16
3. Severe anaemia	4	2.53
Total	158	100

Maternal morbidity

Table 3 summarizes the maternal morbidity due to forceps application. A total of 24 cases of maternal injuries were noted

with 1 case of uterine rupture, 6 cases of complete perineal tear, 15 cases of vaginal and cervical lacerations. Vulvovaginal hematoma was seen in 2 cases which were drained immediately after diagnosis. Furthermore, postpartum hemorrhage occurred in 12 cases, 8 being atonic and 4 traumatic. Blood transfusion was required in 6 cases of Post-partum hemorrhage (PPH).

Uterine rupture was reported in a third gravida with previous lower segment cesarean section (LSCS) where outlet forceps was applied for fetal distress and a 3.2 kg baby was delivered. Immediately post-delivery the Post-partum hemorrhage occurred with deranged vitals of patient. Haemoperitoneum was reported on ultrasound, laparotomy was done and scar rupture was diagnosed. Subtotal hysterectomy was done and the patient was transfused 2 units of whole blood. Her post-operative stay was uneventful. There were 3 cases of failure of forceps where mode of delivery was converted to cesarean section and there were no other complications associated. Hospital stay was lengthened in 15 patients as they were discharged after 48 hours of delivery. The patients with complete perineal tear were discharged after passing stools and when their wound looked healthy.

Table 3: Maternal Morbidity

Morbidity Conditions	Number	Percentage
Maternal injuries	24	15.20
(a). Third and fourth degree perineal tear	6	3.80
(b). Laceration of cervix/vagina	15	9.49
(c). Vulvovaginal Hematoma	2	1.26
(d). Uterine Rupture	1	0.63
(e). Fistula	0	0
Failure of Forceps	03	1.89
Postpartum haemorrhage requiring blood transfusion	6	3.80
Increased length of Hospital Stay (>48hrs)	15	9.49
Total	48	33.09

Birth weight

The baby weights are shown in Table 4. Mean birth weight in our study was 2.84 kg. Forceps application was generally seen in babies of average to high birth weight.

Table 4: Birth Weight of babies

Birth Weight (g)	Number	Percentage
<2000	23	14.56
2000-3000	75	47.47
3000-4000	57	36.08
>4000	3	1.89
Birth Weight (g)	Number	Percentage
Total	158	100

Neonatal outcome

Regarding the Neonatal outcome (Table 5), 15 babies had Apgar score of less than 6 at 1 minute and required resuscitation. A solitary case of still birth was reported which was fetal distress case, 17 required TCU observation for few hours and handed over to mother after preliminary observation. Out of 158 cases, 13 required NICU admission out of which 3 were put on ventilator support, 2 babies expired on the second day and rests were discharged in satisfactory condition. Instrumental marks and bruises were reported in 4.43% cases.

Table 5: Neonatal Outcome

Morbidity	Number	Percentage
Low Apgar Score at 1 & 5 min		
0-3	3	1.90
4-6	12	7.59
*TCU observation	17	10.76
**NICU admission	13	8.23
Scalp, facial marks and bruises	7	4.43
Stillbirths	1	0.63
Perinatal deaths	2	1.26
Total	55	34.81

*TCU- Transition care unit

**NICU- Neonatal intensive care unit

Discussion

The rate of operative vaginal delivery with forceps in our institution during the study period was 1.59 percent. In our study 76.58% cases requiring forceps application were primigravida, a finding similar to the reported rates in a study by Akhtar S *et al.* [9] Episiotomy was given as a routine in all the patients as was also seen in study by Archana D *et al.* [10] The most frequent indication for forceps application in our study was non reassuring fetal heart rate followed by maternal exhaustion. In a study in Texas university the most common indication was fetal compromise and failure to deliver spontaneously with maximum maternal effort, which agrees with our present study [11]. Our findings differed from Singh *et al* [12], where cutting short of second stage of labor was the chief indication followed by prolonged 2nd stage.

Regarding maternal injuries, in our study the most common complication was cervical and vaginal lacerations followed by complete perineal tear, vulvovaginal hematoma and no case of fistula was noted. Johnson *et al* [13] reported more incidence of maternal third and fourth degree perineal lacerations and vaginal lacerations with the use of forceps. While a study in Cameroon reported only minor cervical and vaginal lacerations in cases of forceps deliveries. 14 Minor Vaginal and cervical lacerations were managed by taking extra sutures during episiotomy repair. We noted 6 cases of third and fourth degree perineal tears. These tears were sutured properly in operation theatre under adequate suitable anesthesia. The patients were kept on liquid diet for one day and soft diet with stool softener for another 2 days. According to Eskander O *et al.* [15] risk factors for such tears include nulliparity, high birth weight babies and instrumental delivery for occipito- posterior position of head while instrumental delivery for occipital anterior position of head reduces the risk of severe perineal tear. Complete perineal tears can also occur in unassisted vaginal deliveries in cases of large for gestational age babies, short or rigid perineum, face to pubis delivery, poor perineal support during delivery, sudden extension of the head and shoulder dystocia [16]. In a study of long term follow up after forceps delivery it was concluded that though anal sphincter injury was associated with forceps delivery in past, however significant faecal and urinary incontinence was not [17]. In our study there was only one case of uterine rupture. This patient had a cesarean section 3 years back and was undergoing trial of labor. Labour was augmented with oxytocin which might have caused hyperstimulation leading to non- reassuring fetal heart rate and need of immediate delivery using forceps. Hyperstimulation in a scarred uterus may be a possible explanation of rupture because if caused by the instrument, it generally results from a mid-cavity application of forceps, while in our study only outlet forceps were applied. In a

10 year analysis of uterine rupture Sahu L [18] reported 125 cases of rupture in unscarred uterus out of which only 2 resulted due to instrumental deliveries. Women undergoing trial of vaginal birth after cesarean section already have an increased risk of intra- partum scar rupture of 0.74% [19]. Post partum haemorrhage occurred in 12 patients who were managed with help of fluids, uterotonics and blood transfusion. No significant difference was found in PPH rates amongst the normal and assisted vaginal delivery groups by A Shamsa *et al.* [20] The rate of successful forceps delivery in our study was 98.10% with 3 cases of failure of forceps and where subsequently mode of delivery was changed to cesarean section. In another study by Shashank *et al.* [21], the rate of successful forceps delivery was 100%. The cases of failure were included as part of study as it is a known complication of forceps delivery [22].

Regarding perinatal outcome, forceps application was required in 35 babies weighing over 3.5 kg and 40 babies over 40 weeks of gestational age. Our findings were similar to study by WuWen S *et al* [23], where the use of instruments was more frequent in infants with higher birth weight and gestational age. 15 babies had poor Apgar score of less than 6 at 1 min requiring immediate resuscitation. Meconium staining was present in most of these cases. Abnormal fetal heart rate pattern was the indication for forceps application in majority of them. Fetal compromise as such might have caused the poor apgar scores in these babies rather than the forceps application. The decision of cesarean section in second stage for fetal distress with a deeply engaged head would have led to even worse neonatal outcome by further delaying the delivery due to time taken to shift the patient to an operation theatre and a difficult head delivery during cesarean section.

Garretta K *et al.* [24] in their study found no difference in Apgar score of new born delivered by cesarean section in 2nd stage. Total 7 babies suffered instrumental marks and bruises but majority of these were small and superficial and disappeared in next 24-48 hours. No case of facial palsy or sub- conjunctival hemorrhage was noted in our study. Observational data on instrumental deliveries have suggested that they are associated with neonatal injuries so careful practice can minimize the risks. There was 1 still birth in our study and high fetal mortality could be because of late arrival with meconium stained liquor and manipulation by untrained birth attendants before coming to hospital. Total 17 babies required observation for few hours, 13 required NICU admission out of which 10 were discharged within 3 days. There were 2 early neonatal deaths in which indication was fetal distress and patient came fully dilated with meconium stained liquor.

Conclusion

The obstetric forceps is an effective instrument that may avoid unnecessary Caesarean sections and its complications. It should be used with great caution and the delivery be supervised by trained personnel. It is a reasonable option for the obstetrician to cut down the cesarean section rates in second stage of labour but the patient must be counselled regarding the risks and benefits of alternative approaches. Use of forceps should be rejuvenated so that proper skills to perform forceps delivery in a competent manner are imparted. It is important that the art of forceps is not lost to future generation of obstetricians and the women they care for. Skillful use of obstetric forceps with strict adherence to guidelines can minimise the maternal and neonatal morbidity.

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