

SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE



SHORT TERM MATERNAL AND PERINATAL OUTCOMES OF INSTRUMENTAL VAGINAL DELIVERIES AT SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

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Abbreviations

ACOG- American College of Obstetricians and Gynecologists

AOR- Adjusted odds ratio

BEmONC- Basic emergency obstetric and new born care

CI- Confidence interval

COR- Crude Odds ratio

DOA- Direct occiput anterior

DOP- Direct occiput posterior

EDHS- Ethiopian demographic and health survey

EGOPD- Emergency gynecologic outpatient department

ICU- Intensive care unit

ID- Instrumental Delivery

IRB- Institutional review board

IVD- Instrumental Vaginal Delivery

LOA- Left occiput anterior

LOP- Left occiput posterior

LOT- Left occiput transverse

MCH- Maternal child health

NICU- Neonatal intensive care unit

OA- Occiput anterior

OBGYN- Obstetrics and Gynecology

OP- Occiput posterior

OR- Odds ratio

OT- Occiput Transverse

PPH- Post Partum Hemorrhage

RCOG- Royal College of Obstetricians and Gynecologists

ROA- Right occiput anterior

ROP- Right occiput posterior

ROT- Right occiput transverse

SPHMMC- St. Paul's Hospital Millennium Medical College

SPSS -Statistical Package for Social Science

SSOL- Second stage of labor

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Abstract

Background: Instrumental vaginal delivery refers to a delivery in which the operator uses a forceps or a vacuum device to assist the mother in transitioning the fetus to extra uterine life.

Though instrumental delivery is one of the frequent features of obstetrics practice in tertiary levels of care even in developing countries, currently available evidence and attempts to address maternal and fetal complications associated with this procedure are limited in our set up.

Objective: To determine short term maternal and neonatal outcomes of instrumental vaginal deliveries in St. Paul's Hospital Millennium Medical College.

Method: A cross sectional study was conducted from October 2018-January 2019, on 238 women who delivered with assistance of instrumental delivery in SPHMMC using purposive sampling method. The data was entered using Epidata version 3.1 and analyzed using SPSS version 22 software. Descriptive statistics were conducted to summarize the sample characteristics. Backward stepwise logistic regression model was fitted and AOR with 95% CI was calculated to identify the associated factors. P-value <0.05 was taken as a cut of point for statistical significance. Ethical clearance was obtained from IRB of SPHMMC and informed consent was taken from the study participants.

Result: There were 241 IVDs among 3,165 total deliveries during the study period with ID rate of 7.61%. Out of this 238 of the mothers were included in the study. The maternal complication rate associated with IVD was 15.6% (37/238) whereas fetal complication was 28.15 % (67/238). The most common maternal complication was 2nd degree perineal tear (45.9%), followed by failed vacuum (21.6%) and the commonest neonatal complication was asphyxia (34.3%), followed by cephalhematoma (31.34%).

The result showed that sequential use of ID [AOR=4.82; (95%CI=2.10-27.29)], was significantly associated with IVD related maternal complication. On the other hand fetal position of LOP [AOR=12.43;(95% CI=2.05-18.76)], number of pulls two and three [AOR=1.06 ;(95%CI= 1.01-1.59)] and [AOR=1.19;(95%CI= 1.05-1.67)] respectively and sequential use of ID [AOR=6.43; (95%CI=1.19-14.73)] were significantly associated with fetal complications.

Conclusion: Overall, maternal and fetal complications of instrumental vaginal delivery among mothers and neonates who delivered through ID in SPMCH are high.

Key words: Forceps, Vacuum, Instrumental delivery, Perinatal outcome, Maternal outcome

Introduction

1.1. Background

A vaginal delivery accomplished with the help of instruments that can be either forceps or vacuum is termed as instrumental vaginal delivery. It is accomplished by applying direct traction on the fetal skull with forceps, or by applying traction to the fetal scalp by means of a vacuum extraction [1].

Instrumental vaginal delivery offers the option of an operative procedure to safely and quickly deliver the fetus. When spontaneous vaginal delivery does not occur within a reasonable time, a successful instrumental vaginal delivery trial avoid caesarean section with its attendant uterine scar and implications for a future pregnancy and avoids potential birth asphyxia from complications of prolonged labor [2].

The first instrumental deliveries were performed to extract fetuses from parturient that were at high risk of maternal mortality due to prolonged and/or obstructed labor. In these cases, saving the mother's life weighs over possible harm to the fetus. The focus of these procedures has changed as a result of modern obstetrical practices that have drastically reduced the risk of intra partum maternal mortality and major morbidity. Decisions regarding use of instrumental delivery are now based primarily upon the fetal/neonatal and maternal impact of these procedures and are weighed against the alternative options of cesarean birth [3].

James Young Simson was the first to use traction with vacuum to deliver a baby in 1840. It was later modified by Malmstrom in 1953. The obstetric forceps also had its history from the time of Chamberlain family in the seventh century [4].

Results from the 2016 Ethiopian demographic health statistics (EDHS) data showed perinatal mortality rate of 33 deaths per 1,000 pregnancies. The pregnancy related mortality ratio was 412 maternal deaths per 100,000 live births for the 7 years before the survey. To reduce the mortality ratio caesarean section and instrumental delivery, in conjunction with other life support measures, are considered to be instrumental to avert perinatal as well as maternal deaths [5].

1.2 Statement of the problem

Maternal and fetal complication rates of instrumental deliveries depend on a number of factors. They are hampered by a number of biases including level of experience of the operator, changes in practice, clinical scenario and type of instrument used [6]. Even though it is associated with maternal and neonatal morbidity, in recent years, the success rate for instrumental vaginal deliveries has been quite high [7]. This likely reflects appropriate choice of candidates for this intervention [8].

The decision as to whether or not a particular birth requires assistance and the choice and timing of any intervention must involve consideration of the risks of the potential techniques and the skills of the operator, as well as the urgency of the need to expedite the birth process [9].

Currently studies show that there is a decreasing trend of instrumental deliveries and is a major concern in health care system all over the world. Assessing the trends of instrumental deliveries and its major indications would be useful in adopting suitable measures to reduce the caesarean section rate and the problems associated with it [10].

Though instrumental delivery is one of the frequent features of obstetrics practice in tertiary level of care even in developing countries, currently available evidence and attempts to address maternal and fetal complication associated with this procedure are limited in our set up.

1.3 Significance of the study

Instrumental vaginal delivery (IVD) is a key element of essential obstetric care, and scaling up its use in resource poor countries through training and supply of appropriate equipment is likely to contribute significantly to reduce maternal and newborn morbidity and mortality. Because most women prefer a vaginal delivery, focused experience with the use of these instruments is crucial to ensure safe, timely, and effective vaginal delivery in a specific clinical situation.

Training and research in instrumental vaginal delivery will improve the benefit for mothers and their babies and also, maintain and improve the skills for these procedures. In order to minimize both maternal and fetal risks, the operator must be familiar with the indications, contraindications, application, and use of the particular instrument.

Since there are no local auditing systems on complications associated with instrumental deliveries; this study will help to provide a base line data for IVD and it will also identify the type of instrument used, as well as the associated complications. It will aid in improvement of the quality of care and also be a base for further studies.

2. Literature review

Based on a two years retrospective cross sectional analytical study that was conducted from July 2013 to June 2015 in the obstetric department of Shire, Suhul General Hospital, Tigray, Ethiopia to assess Complications of Instrumental Vaginal Deliveries and Associated Factors, low instrumental delivery accounted for (58.3%) followed by out let and mid pelvis instrumental deliveries, 28.6% and 13.2% respectively. Fetal distress was the most common indication for instrumental delivery (44.3%) and Forceps assisted vaginal delivery was also frequently used instrumental delivery (55.2%) than vacuum. (45.4%) of instrumental vaginal deliveries were complicated, of this (59.8%) were maternal complication. Perineal tear was the leading maternal complication (92.7%) and low Apgar score recorded as commonest fetal complication (83% of all fetal complications), 63% of these neonates were asphyxiated. Second degree perineal tear accounts for (45.6%) the perineal tears and one case of uterine rupture was observed. Application of high instrumental vaginal delivery (station above 2) and low instrumentation are having fetomaternal complication than out let instrumental delivery. Fetal weight, type of instrument and indication of instrumental delivery were significantly associated with complications [3]. According to a cross-sectional study done in Jimma university Prevalence of operative vaginal delivery is found to be 10.3% with the commonest indication of nonreassuring fetal heart rate pattern. Nearly all of mothers and neonates had favorable outcome. Type of instrument applied for operative vaginal delivery is the strongest predictor of neonatal outcome while neonatal birth weight is the only predictor of maternal outcome identified in this study[37].

There was a case-control study of instrumental vaginal deliveries performed at the Ahmadu Bello University Teaching Hospital Zaria over a 5-year period spanning January 1, 1997 to December 31, 2001. In this study the instrumental vaginal delivery rate of 3.58% over the study period. Overall, instrumental vaginal delivery had a complication rate of 41.6% (11.8% maternal and 29.8% fetal). In the case of forceps-assisted deliveries, 15.8% of mothers who had the procedure-developed complications, while for vacuum-assisted deliveries 8% of the mothers sustained a complication. On the other hand, 8.9% of newborns delivered by forceps had complications, while vacuum-assisted delivery was associated with complications in 11% of newborns. Skin bruises were commonly associated with forceps delivery and neonatal jaundice and cephalhaematoma were found to be commonly associated with vacuum deliveries. There

were four fetal deaths following vacuum deliveries. Instrumental vaginal deliveries were mostly performed among infants weighing 2.52-3.99 kg. Forceps delivery was most frequently performed in low birth weight infants (59.6%) [14].

According to a 5-year retrospective descriptive study done from 1st January, 2008 to 31st December, 2012 at Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria on Case notes of patients who had forceps or vacuum delivery, the overall incidence of instrumental delivery was 1.06%. The incidence for vacuum-assisted delivery was 0.98%, while that for forceps was 0.08%. Delayed second stage of labor (68.4%) was the most common indication for IVD. Majority (99.3%) of the procedures were successful. There was (0.7%) failed procedure (vacuum) for which caesarean section was performed. The gestational age at which IVD was performed ranged from 32 to 42 weeks with a mean of 38.07 ± 1.7 weeks. Most (81.6%), of the procedures were performed on term neonates ($GA \geq 37$ weeks). The birth weights of the neonates ranged from 2 to 4.9 kg. Junior Resident doctors applied the instruments in (71.4%) procedures, while Senior Residents and Consultant Obstetricians conducted (25%) and (4.6%) procedures, respectively. The overall complication rate for the procedures was 18.4% in the mothers and 4.6% in the neonates. The most common maternal complication was postpartum hemorrhage (11.8 %) followed by perineal laceration (5.9%) and cervical laceration (0.7%). Few (4.6%), neonates had mild-to-moderate asphyxia. Majority (82.9%), of the neonates were discharged home with their mothers within 10 hours of the procedure. There was (0.7%) maternal and (0.7%) perinatal mortality among the group [2].

In a Prospective Observational study carried out from Jan 2015 – Dec 2015 on Instrumental vaginal deliveries at tertiary centre In India, the incidence of instrumental delivery was 2.77%. 70.56% of indications were for prolonged second stage of labor and 11.03% for fetal distress. The most common maternal complication was cervical tear (12.04%) followed by extension of episiotomy, Excessive blood loss requiring blood transfusion each accounting for (9.03%), (0.66%) respectively. 57.19% cases were primigravidas. They observed that 70.56% of the newborn with good APGAR score >6 at 1min. There were 2% cases of Fresh still birth noted. 82 newborn babies required NICU admission due to birth asphyxia. Humerus fracture was noted in one baby following forceps application. 2 newborns had convulsions (0.66%) and 1 newborn had cephalhematoma (0.33%) [1].

In consistent to a retrospective hospital based study which was carried out in the Department of Obstetrics & gynecology of Yenepoya Medical College in Mangalore, Karnataka over a period of 1 year from December 2015 to December 2016, 80% of forceps delivery and 70% of vacuum deliveries were carried out. Fetal distress (30%) was more in the forceps deliveries. Poor maternal efforts were found in (24%) in forceps group and (20%) in vacuum group. Prolonged 2nd stage of labor was encountered in 20% of forceps and 30% of vacuum group. Third and fourth degree Perineal tears were observed in 4% in forceps than in the vacuum group. Face marks with abrasions was seen in 6 cases of forceps and 4 cases in vacuum group whereas six cases of cephalhematoma seen in forceps group. Attempted vacuum delivery was successful in 38 cases. Perineal and cervical tears are more common in forceps compared to vacuum delivery. No significant difference seen for admission required to neonatal intensive care unit [2].

Based on Retrospective analysis of all vacuum deliveries conducted at Pravara Rural hospital, Pakistan from 1st October 2010 to 31st March 2012, (0.85%) were instrumental deliveries.

Among instrumental deliveries, (86.66%) were vacuum deliveries and (13.34%) were forceps deliveries. In seventy percent cases, vacuum was applied by consultant and thirty percent by resident doctor under supervision of Consultant. 65% cases were primigravidas and remaining were multigravidas. With increasing parity, the incidence of vacuum delivery decreased.

Previous caesarean section and maternal exhaustion were the commonest indications for vacuum application. Eight percent cases had either perineal or cervicovaginal tears that required suturing. There was one case of third degree perineal tear. Two cases required blood transfusion for atonic postpartum hemorrhage following vacuum delivery. (19.23%) had morbidity in the form of birth asphyxia or birth trauma. There were two neonatal deaths and one fresh stillbirth [15].

In a retrospective study carried between 01/06/2014 to 31/08/2014 at Cheluvamba Hospital, Mysore Medical College and Research Institute, Malaysia, there were total of 3385 deliveries. Total instrumental vaginal deliveries were (3.2%). 33 Vacuum assisted vaginal deliveries (0.9%), 57 Low forceps deliveries (1.68%) and 20 Outlet forceps deliveries (0.59%). Most common indication for instrumental deliveries being fetal distress (62 cases), Prolonged second stage of labor and maternal exhaustion (36 cases). Cut short 2nd stage of labor- (8cases) and Eclampsia (2cases), RHD(1case). Number of alive babies (103 babies), Perinatal mortality 7cases (0.20%), 8 babies required NICU admission for 3-4 days, 1 baby had subdural hematoma, 2 babies had

forceps mark. Complications like vaginal tear were (4 cases), episiotomy extension (18 cases) [27].

In a Randomised controlled trials of assisted vaginal delivery using different instruments, forceps were less likely than the vacuum to fail to achieve a vaginal birth with the allocated instrument (risk ratio (RR) 0.65, 95% confidence interval (CI) 0.45 to 0.94). However, with forceps there was a trend to more caesarean sections, and significantly more third- or fourth-degree tears (with or without episiotomy), vaginal trauma, use of general anaesthesia, and flatus incontinence or altered continence. Facial injury was more likely with forceps (RR 5.10, 95% CI 1.12 to 23.25). There was a trend towards fewer cases of cephalhaematoma with forceps (average RR 0.64, 95% CI 0.37 to 1.11). Among different types of vacuum, the metal cup was more likely to result in a successful vaginal birth than the soft cup, with more cases of scalp injury and cephalhaematoma [1].

According to a prospective observational audit of 119 consecutive attempted vacuum deliveries of nulliparous women which was undertaken during 2011 and 2012 at Caboolture Hospital, a regional tertiary referral centre in Queensland, Australia. Detachment of the cup occurred in (6.7%) extractions and vacuum delivery failed in (9.2%). Five of the cup detachments occurred in failed vacuum deliveries. Following unsuccessful vacuum extraction, the method chosen to complete the delivery was Caesarean section in 5 patients, outlet forceps in 5 and spontaneous vaginal delivery in one patient. Third-degree perineal lacerations were recorded in (11.8%) mothers 11 of the 14 women who sustained sphincter lacerations also had an episiotomy to facilitate delivery. Neonatal scalp abrasion and cephalhaematoma were more common in infants delivered with traction that exceeded 11.5 kg [17].

Based on RCOG green top guideline on instrumental vaginal delivery, Vacuum and forceps delivery can be associated with significant complications, both maternal and fetal. Two maternal deaths have been described in association with tearing of the cervix at vacuum delivery and a further maternal death has been described following uterine rupture in association with forceps delivery. In a review of 583, 340 live born singleton infants born to nulliparous women, the rate of subdural or cerebral hemorrhage in vacuum deliveries (one in 860) did not differ significantly from that associated with forceps use (one in 664) [18] [19].

3. Objectives

3.1 General objective

To determine Short term maternal and perinatal outcome of instrumental vaginal deliveries (IVD) in Saint Paul's Hospital Millennium Medical College.

3.2 Specific objectives

3.2.1. To describe patterns of immediate maternal and perinatal complications of instrumental vaginal delivery.

3.2.2. To assess factors associated with complications of instrumental vaginal delivery.

3.2.3. To compare complications by type of IVD (forceps Vs vacuum).

4. Method

4.1. Study area

The study was conducted at St. Paul's Hospital Millennium Medical College which is a tertiary hospital, located in the western part of Addis Ababa; Gullele sub city. It was built by Emperor Haile Selassie I in 1969 with the help of the German Evangelical Church. Among the different departments of the hospital, MCH care service is one of the leading provision, under which there are around 120 beds and provides service to an annual average of 11,500 deliveries through its emergency, outpatient and inpatient services for a catchment population of more than 5 million, including 16 catchment health centers under it. Instrumental vaginal deliveries account for 6-8% of the deliveries monthly according to the monthly perinatal report.

4.2 Study period

The study was conducted from October 1, 2018 up to January 31, 2019 GC.

4.3 Study design

This was a cross sectional study of mothers who had instrumental vaginal delivery.

4.4 Source Population

The source population of the study were all mothers who delivered at SPHMMC during the study period.

4.5 Study Population

All mothers who had instrumental vaginal delivery and all neonates who were delivered by IVD.

4.6 Study Variables

The variables were included in the Socio-demographic profiles of the mothers, clinical condition of the mother, the operator, the indications of instrumental delivery, the common type of instrument used, and the frequently seen maternal and fetal complications.

Independent Variables

Age of the mother

Birth weight

Gestational age

Duration of second stage

Number of pulls

Parity

Address

Ethnicity

Position of the fetus

Caput

Molding

Type of instrument

Presence of episiotomy

Operator

Indication

Urethral Catheterization

Maternal medical illnesses

Sequential use of Instruments

Presentation of the fetus

Station of the fetus

Dependent variables

- Maternal complications
- Neonatal complication

4.7 Operational definition

Except for second degree perineal tear, standard definitions were used.

Second degree laceration: A second degree perineal tear that occurred solely with the application of the ID but without giving episiotomy.

Third-degree: perineal laceration that involves the anal sphincter.

Fourth-degree: perineal laceration that involves the rectal mucosa

Failed instrumental delivery: descent does not proceed with traction, or the baby has not been delivered within 30 minutes or three pulls.

Vaginal hematoma: a collection of blood that pools in the soft tissues of the vagina.

Vulvar hematoma: collection of blood in the vulvar tissue.

Cephalohematomas: cranial subperiosteal hematomas in the neonate.

Subgaleal hemorrhage: blood collection in between the galeaaponeurotica and the periosteum of the neonate.

Asphyxia: insults to fetal brain due to decreased oxygen supply.

4.8 Inclusion and exclusion criteria

4.8.1 Inclusion Criteria

1. All mothers who underwent any type of instrumental vaginal delivery in SPHMMC during the study period were considered in the study who were willing to participate and not seriously ill.
2. All neonates delivered by instrumental deliveries at SPHMMC during the study period and were on their early neonatal period (From delivery- 7 days of life).

4.8.2 Exclusion Criteria

1. Mothers who had instrumental vaginal delivery elsewhere, but referred to SPHMMC for different reasons.

2. Neonates who were referred to neonatal ICU for reasons other than complications associated with instrumental delivery.

4.9 Sampling procedure

All mothers who delivered at SPMMHC who met the inclusion criteria were included in this study using purposive sampling method until the sample size is met.

4.10 Sample size determination

The sample size was determined using single population proportion.

$$n = \frac{Z_{\alpha/2}^2 p(1-p)}{d^2}$$

Taking $P=0.83$ which is the incidence of the most common fetal complication after IVD, taken from a study done in Tigray [3] and considering 5% marginal error, 95% confidence interval.

Where z = standard score corresponding to 95% confidence interval=1.96, d = the margin of error (precision) =0.05 and n = the required sample size. Non response rate 10%.

$$n = \frac{(1.96)^2 \cdot 0.83(1-0.83)}{(0.05)^2} = 216;$$
$$216 + (216 \cdot 10/100) = 238$$

This gives us a sample size of 238.

4.11 Data collection

The clinical data were collected using a check list prepared in English, which was developed by reviewing different literatures and from clinical experience. It contains socio demographic data of the mothers, clinical data of the mother and clinical data of the neonate. Information was extracted by reviewing the mothers' and the neonates' case records of intrapartum fetal and maternal state and immediate fetomaternal outcomes. Socio demographics were collected at exit using structured interviewer administered questionnaire that was carried out by trained data collectors.

BSc nurses and midwives were hired who had been trained on how to fill the questionnaire at the labor ward, EGOPD and also at the NICU. Data collectors were able to identify those mothers

who gave birth by IVD and then review their chart for development of complication and neonatal referral to NICU. Information that couldn't be retrieved from the chart was completed by interviewing the mothers.

4.12 Data quality assurance

Data collection was conducted by trained data collectors but in order to assure the quality of the collected data, completeness was checked by the principal investigator.

4.13 Data processing and analysis

Collected data was coded; cleaned using EPI info version 3.1 and the data was exported to SPSS version 22 for analysis. Descriptive analysis was done for each variable in the study by running frequencies. Categorical variables were expressed as number (percentage, %). Cross-tabulation with frequencies and percentage of each variable was performed to explore the relationship between the dependent variable and independent variables. Multivariable logistic regression model was fitted to predict the association between short term complications of IVD and their determinants. For numerical variables first, bivariate analysis was done to identify candidate variables for multivariable logistic regression, those variables with a $P < 0.25$ were moved to multivariable analysis to identify their significance with the dependent variables. All statistical analysis were set at 5% level of significance i.e. $p < 0.05$. The results were reported as Odds Ratio and 95% CI. Dependent variables were also reported as (frequency, percentage and 95% CI). Appropriate tables and diagrams were used to present findings.

4.14 Strengths of the Study

The study was conducted in one of the tertiary hospital with large number of deliveries. As calculated in the sample size 238 mothers were included. Complete data was obtained from all mothers yielding a response rate of 100%

4.15 Limitations of the study

Since the study was record based some data might not be accurately documented or adverse outcomes might not be registered and therefore the findings would be missed. The sample size was also and it was conducted within a short study period.

4.16 Dissemination of the Result

There was presentation of the research outputs to the college community. The copies of the final result will be disseminated to department of OBGYN, public health department and ministry of health. Attempts will be made to publish in peer reviewed and reputable national or international journals.

4.17 Ethical consideration

A formal letter of approval was obtained from the college's ethical review committee. Permission to conduct the study was taken from the IRB. Confidentiality was maintained during data collection, analysis and interpretation by identifying data before it had entered into the study data base and coding any identifying information about participants. After giving detailed explanation and assuring that there was no harm, informed written consent was obtained from the participants. The study subjects were told that they can refuse /withdraw whenever they want.

5. Result

There were 3,165 deliveries at SPHMMC during the study period out of which 241(7.61%) were instrumental vaginal deliveries, 3 of the mothers were excluded because they had a trial of IVD elsewhere.

5.1 Socio demographic factors

A total of 238 mothers were included in the study; - Complete data was obtained from 238 mothers, yielding a response rate of 100%. The socio-demographic characteristics of the mothers' are shown on (Table1). The age distribution of the participants showed that almost 208 (87.4%) belonged to the age group of 20-34 and 19(8%) were teenage pregnancies. More than half of the mothers, 124 (51.7%) came from Oromia region.

Table 1: Socio-demographic characteristics of women who delivered through IVD in SPHMMC, Addis Ababa, Ethiopia 2019 (n=238)

Variable		Frequency	Percentage
Age	<=19	19	8.0
	20-34	208	87.4
	35-49	11	4.6
Address	Addis Ababa	29	12.2
	Amhara region	85	35.7
	Oromia region	124	51.7
Ethnicity	Amhara	112	47.1
	Oromo	117	49.2
	SNNPR	5	2.1
	Tigre	2	0.84
	Others	2	0.84

5.2 Obstetric Related Variables.

According to this study 152 (63.9%) of the mothers were primiparous. 208(87.5%) of the mothers delivered at gestational age of 37-41⁺⁶ weeks. 177(74.4%) of the participants had episiotomy. As indicated on (table 2) 199 (83.6%) of the instruments were applied at low station. Mothers who delivered using vacuum were 155(65.1%) and who delivered through forceps delivery accounted for 83(34.9%) of cases with a ratio of about 2:1. The most common Indication for IVD was found to be NRFHRP 113(47.5%) followed by prolonged Second stage of labor 108(45.4%). 158(66.4%) of the instruments were applied by third year residents.

5.3 Fetus Related Variables.

Almost all, 235(98.7%) of the fetal presentations were vertex while 3(1.3%) were face presentations. 206(86.5%) of the fetuses were in OA position. 186(78.1%) of the fetuses had no caput and 197(82.8%) had no molding. Neonates weighing 2,500- 3,999 gm accounted for 204(85.7%) of the cases.

Table 2: Instrumental vaginal delivery and related factor among women delivered in SPHMMC, Addis Ababa, Ethiopia, 2019 (n=238).

Variable	Frequency	Percentage
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Parity	I	152	63.9
	II-V	80	33.6
	>V	6	2.5
Birth weight			
	<2,500gm	27	11.4
	2,500-3,999gm	204	85.7
	≥4,000gm	7	2.9
Gestational age			
	34-36 ⁺⁶ week	19	7.9
	37-41 ⁺⁶ week	208	87.5
	≥42 week	11	4.6
Station of the fetus			
	Low	199	83.6
	Out let	39	16.4
Position of the fetus			
	LOA	130	54.6
	ROA	68	28.6
	LOP	8	3.36
	ROP	15	6.3
	LOT	9	3.8
	DOA	8	3.4
Caput			
	None	186	78.1
	Moderate	18	7.6
	Mild	34	14.3
Molding			
	None	197	82.8
	+1	38	15.9
	+2	3	1.3
Type of instrument used			
Vacuum		155	65.1
	Metallic	42	26.9
	Plastic	113	73.1
Forceps		83	34.9
Episiotomy			

	Yes	177	74.4
	No	61	25.6
Fetal Presentation			
	Face	3	1.3
	Vertex	235	98.7
Indication for IVD			
	Prolonged SSOL	108	45.4
	Shorten SSOL	17	7.1
	NRFHRP	113	47.5
Catheterization			
	Yes	195	81.9
	No	43	18.1
Maternal medical illness			
	Yes	24	10.1
	No	213	89.9
Operator			
	Midwife	5	2.1
	RII	50	21.0
	Intern	3	1.3
	RIII	158	66.4
	RI	5	2.1
	RIV	17	7.1

5.4 Complications of Instrumental vaginal delivery

5.4.1 Maternal complications of instrumental delivery

In this study, 37 out of 238 (15.6%) mothers developed maternal complication. As indicated on (figure 1) 17 (45.9%) of the mothers had 2nd degree perineal tear, 8 (21.6%) had failed vacuum, 4 (10.8%) had vulvar hematoma, 4 (10.8%) had PPH, 2 (5.4 %) had vaginal hematoma and 2 (5.4%) had 3rd degree perineal tear.

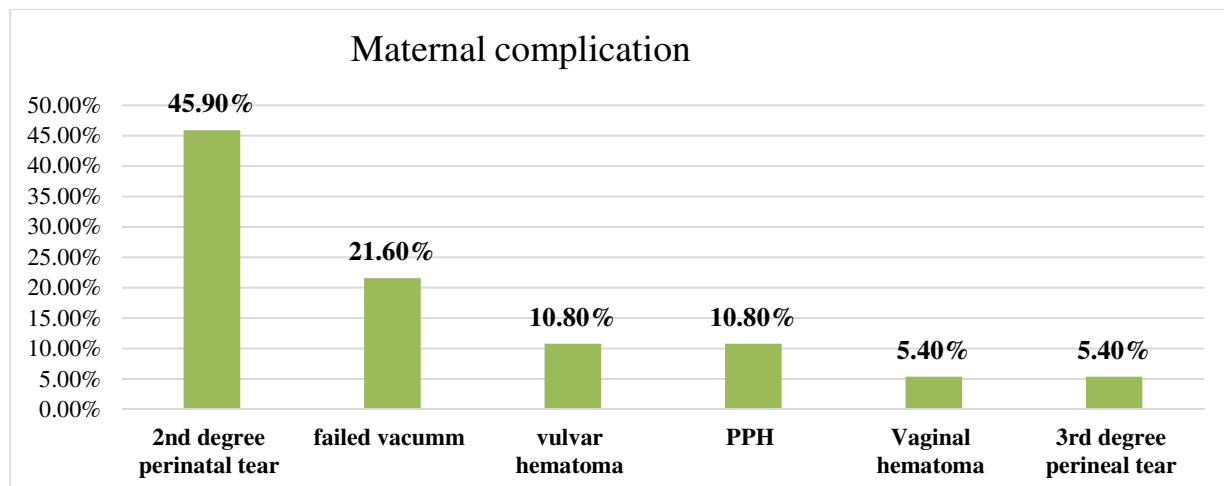


Figure1: Maternal complications of instrumental vaginal delivery, SPHMMC, Addis Ababa, Ethiopia, 2019(n=37)

5.4.2 Fetal complications of instrumental delivery

From the total deliveries 67(28.15%) of the fetuses had developed complication. From this 23 (34.3%) were asphyxiated, 21(31.34%) had cephalhematoma, 13(19.4%) had subgaleal hemorrhage, 10(14.92%) had scalp laceration, 4(5.97%) had facial nerve palsy while 1(1.49%) had skull fracture and 1(1.49%) had subconjunctival hemorrhage, as shown on (Figure 2).

Perinatal death was 18(7.5%) from the total babies delivered with ID.

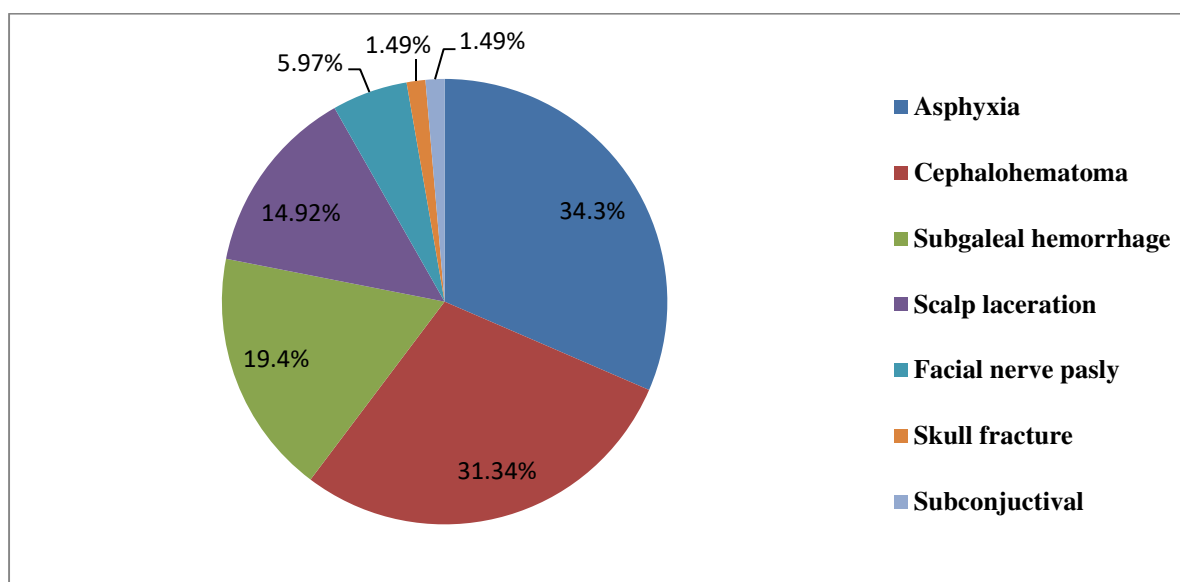


Figure 2: Fetal complications of IVD among fetuses delivered in SPHMMC, Addis Ababa, Ethiopia, 2019(n=67)

Table 3: Maternal and Neonatal outcome after IVD in SPHMMC, Addis Ababa, Ethiopia, 2019

Variable	Condition	Frequency	Percentage
Condition of the mother at discharge			
	Improved	37	100
Condition of neonate at 7th day	Improved	16	23.88
	Same	14	20.89
	Discharged	19	28.35
	Died	18	26.86

5.5 The relationship between IVD and maternal complication

The covariates that were significantly associated (p -value<0.25) with maternal complications on the bivariate analysis were fitted into the backward stepwise multi variable binary logistic regression model to control for confounding. The final predictor of maternal complication was sequential use of instrumental delivery. Mothers who delivered with sequential use of ID were 4.82 times more likely to develop complication than those who delivered with the use of one instrument only [AOR=4.82 ;(95%CI= 2.10-27.29)].

Table 4: Factors associated with maternal complications, SPHMMC, Addis Ababa, Ethiopia, 2019(n=238)

Variable	Maternal complication		COR(95% CI)	AOR(95% CI)
	Yes n(%)	No n(%)		
Age of the mother				
<=19	9(47.4)	10(52.6)	0.29(0.09-0.92)	1.71(0.13-0.23.10)
20-34	23(11.1)	185(88.9)	1	1
35-49	5(45.4)	7(63.6)	0.23(0.07-0.77)*	1.99(0.05-81.80)

Parity

P-I	23(62.16)	129(64.18)	0.92(0.43-1.92)	0.82
P- II-V	13(35.14)	67(33.33)	1	1
P->V	1(2.70)	5(2.49)	0.89(0.09-7.98)	0.92

Birth weight

<2,500gm	8(21.62)	19(9.45)	3.15(1.25-7.99)*	2.79(0.32-24.62)
2,500-3,999gm	24(64.86)	180(89.55)	1	1
>=4,000gm	5(13.51)	2(1.00)	0.17(0.03-1.05)	1.51(0.14-16.17)

Gestational age

34-36 ⁺⁶ week	9(24.32)	10(4.98)	0.13(0.05-0.37)*	1.07(0.01-0.46)
37-41 ⁺⁶ week	23(62.16)	185(92.04)	1	1
>=42 week	5(13.51)	6(2.99)	0.14(0.04-0.52)*	1.05(0.00-0.75)

Caput

None	13(35.14)	173(86.07)	1	1
Moderate	11(29.73)	7(3.48)	0.05(0.02-1.44)*	0.06(0.03-1.23)
Mild	13(35.14)	21(10.45)	0.12(0.05-0.29)*	0.42(0.06-2.86)

Molding

None	16(43.24)	181(90.05)	1	1
+1	21(56.76)	17(8.46)	0.07(0.03-0.16)	0.14(0.02-1.07)
+2	-	3(1.49)	-	-

Station of the fetus

Low	30(81.08)	169(84.07)	0.56(0.26-1.19)	2.04(0.29-14.03)
Out let	7(18.91)	32(15.92)	1	1

Position of the fetus

LOA	18(48.65)	112(55.72)	1.12(0.13-9.69)	1.16(0.04-31.38)
ROA	9(24.32)	59(29.35)	1.05(0.44-2.49)	6.68(0.88-50.34)
LOP	3(8.11)	5(2.49)	0.27(0.05-1.22)	11.71(0.54-84.49)
ROP	4(10.81)	11(5.47)	0.44(0.12-1.53)	0.85(0.04-14.59)
LOT	2(5.41)	7(3.48)	0.56(0.11-2.92)	1.35(0.04-29.50)
DOA	1(2.70)	7(3.48)	1	1

Type of instrument used

Vacuum	19(51.35)	136(67.66)	1	1
Forceps	18(48.65)	65(32.34)	0.50(0.25-1.03)*	1.39(0.29-6.63)

Episiotomy

Yes	26(70.27)	151(75.12)	1	1
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No	11(29.73)	50(24.88)	0.78(0.36-1.69)	2.97(0.27-32.45)
Presentation of the fetus				
Face	2(5.41)	1(0.50)	1	1
Vertex	35(94.59)	200(99.50)	11.42(1.00-12.94)*	16.33(0.03-96.15)
Indication for IVD				
Prolonged SSOL	16(43.24)	92(45.77)	2.39(0.74-7.72)*	2.32(0.05-92.76)
Shorten SSOL	5(13.51)	12(5.97)	1	1
NRFHRP	16(43.24)	97(48.26)	2.52(0.78-8.13)*	2.88(0.07-10.3)
Maternal Medical illness				
Yes	10(27.78)	14(6.97)	1	
No	26(72.22)	187(93.03)	5.13(2.06-12.75)	0.32(0.02-4.61)
Sequential use of ID				
Yes	7(18.92)	12(5.97)	3.67(1.34-10.07) *	4.82(2.10-27.29)* *
No	30(81.08)	189(94.03)	1	1
No. of pulls				
3	10(27.03)	10(4.98)	0.10(0.03-0.316)	0.12(0.01-1.57)
2	19(51.35)	112(55.72)	0.59(0.25-1.43)	0.49(0.12-2.27)
1	8(21.62)	79(39.30)	1	1
Operator				
Midwife	1(1.49)	4(2.34)	0.35(0.32-3.91)	0.39(0.13-1.89)
RII	12(17.91)	38(22.22)	0.79(0.08-7.78)	0.84(0.52-1.56)
Intern	1(1.49)	2(1.17)	0.50(0.01-12.89)	0.67(0.25-16.98)
RIII	45(67.16)	113(66.08)	0.62(0.06-5.77)	0.68(0.31-11.09)
RI	1(1.49)	4(2.34)	0.86(0.21-6.98)	0.97(0.54-15.98)
RIV	7(10.45)	10(5.85)	1	1

* Significant in bivariate analysis

** Significant in multivariate analysis

5.6 The relationship between IVD and fetal complications

Multivariable logistic regression was done to see the association of each independent variable with the outcome variable (fetal complication). Fetal position showed significant association with fetal complication. Fetuses with fetal position of left occiput posterior were 12.43 times

more likely to have fetal complication than those fetuses with direct occiput anterior [AOR=12.43;(95% CI: 2.05-18.76)]

Regarding the number of pulls, fetuses born with two pulls were 1.06 times more likely to develop fetal complication [AOR=1.06 ;(95%CI= 1.01-1.59)] and fetuses delivered with three pulls were 1.19 time more likely to develop fetal complication [AOR=1.19 ;(95%CI= 1.05-1.67)] than those delivered using one pull.

Furthermore, Fetuses delivered with sequential use of ID were 6.43[AOR=6.43; (95%CI=1.19-14.73)] time more likely develop fetal complication than those with no sequential use of ID.

Table 5: Factors associated with fetal complication, SPHMMC, Addis Ababa, Ethiopia, 2019(n=238)

Variable	Fetal complication		COR(95% CI)	AOR(95% CI)
	Yes n(%)	No n(%)		
Birth weight				
<2,500gm	13(19.40)	14(8.19)	2.93(1.29-6.67)	1.38(0.19-10.17)
2,500-3,999gm	49(73.13)	155(90.64)	1	1
>=4,000gm	5(7.46)	2(1.17)	0.37(0.06-2.25)	6.12(0.04-18.95)
Gestational age				
34-36 ⁺⁶ week	12(17.91)	7(4.09)	5.71(2.13-15.32)	4.65(0.80-26.98)
37-41 ⁺⁶ week	48(71.64)	160(93.57)	1	1
>=42 week	7(10.45)	4(2.34)	0.98(0.21-4.57)	0.81(0.05-14.13)
Parity				
P-I	44(65.67)	108(63.16)	1.22(0.66-2.26)	0.52(0.34-13.56)
P -II-V	20(29.85)	60(35.09)	1	1
P->V	3(4.48)	3(1.75)	0.41(0.08-2.09)	0.28(0.15-12.95)
Position of the fetus				
LOA	30(44.78)	100(58.48)	4.08(0.86-19.22)	13.59(0.03-19.32)
ROA	17(25.37)	51(29.82)	4.00(0.81-19.70)	11.59(0.76-17.66)
LOP	4(5.97)	4(2.34)	1.33(0.17-10.25)*	12.43(2.05-18.76)**
ROP	6(8.96)	9(5.26)	2.00(0.32-12.32)	9.12(0.26-31.27)
LOT	6(8.96)	3(1.75)	1.06(0.14-7.82)	3.35(0.06-17.81)
DOA	4(5.97)	4(2.34)	1	1

Caput				
None	10(14.92)	156(91.22)	1	1
Moderate	30(44.77)	7(4.09)	0.07(0.04-12.44)	0.08(0.05-2.73)
Mild	27(40.29)	8(4.67)	0.22(0.08-1.39)	0.39(0.06-6.96)
Molding				
None	40(91.81)	157(91.81)	1	1
+1	25(37.31)	13(7.60)	0.13(0.06-0.28)	0.16(0.03-0.89)
+2	2(2.99)	1(0.58)	0.13(0.01-1.44)	0.17(0.01-6.13)
Station of the fetus				
Low	48(71.64)	151(88.3)	0.66(0.18-2.15)	4.04(0.65-13.03)
Out let	19(28.35)	20(11.69)	1	1
Operator				
Midwife	1(1.49)	4(2.34)	0.35(0.32-3.91)	0.39(0.02-15.8)
RII	12(17.91)	38(22.22)	0.79(0.08-7.78)	0.84(0.35-11.8)
Intern	1(1.49)	2(1.17)	0.50(0.01-12.89)	0.67(0.43-10.87)
RIII	45(67.16)	113(66.08)	0.62(0.06-5.77)	0.68(0.57-7.56)
RI	1(1.49)	4(2.34)	0.45(0.31-06.95)	0.57(0.01-4.87)
RIV	7(10.45)	10(5.85)	1	1
No. of pulls				
1	16(23.88)	71(41.52)	1	1
2	38(56.72)	93(54.39)	1.12(0.04-2.35)*	1.06(1.01-1.59)**
3	13(19.40)	7(4.09)	1.56(0.28-2.06)*	1.19(1.05-1.67)**
Sequential use of ID				
Yes	10(14.93)	9(5.26)	3.15(1.22-8.16)*	6.43(1.19-34.73)**
No	57(85.07)	162(94.74)	1	1
Maternal Medical illness				
Yes	15(22.39)	9(5.29)	5.16(2.13-12.48)	0.31(0.03-3.06)
No	52(77.61)	161(94.71)	1	1

* Significant in bivariate analysis

** Significant in multivariate analysis

5.7 Comparison of maternal and fetal complications between forceps and vacuum delivery

Out of the 238 IVDs mothers who delivered with assistance of vacuum were 155(65.1%) and who delivered through forceps delivery accounted for 83(34.9%) of cases. When compared to

the total number of deliveries vacuum delivery accounted for 4.89% of the cases and forceps delivery for 2.62% of cases with a ratio of about 2:1.

5.7.1 Comparison of maternal complications by the type of instrument: vacuum verses forceps delivery

The data indicated that from the total of 83 mothers delivered using forceps 18 (21.7%) of them developed maternal complication. Whereas, from the total of 155 mothers delivered using vacuum 19(12.3%) of the mothers developed maternal complication.

Table 6: Comparing maternal complications between vacuum and forceps delivery in SPHMMC, Addis Ababa, Ethiopia, 2019 (n=238)

Variable	Maternal	Complication	P-value
	Yes n(%)	No n(%)	
Vacuum	19(12.3)	136(87.7)	0.036
Forceps	18(21.7)	65(78.3)	

5.7.2 Comparison of fetal complications by the type of instrument: vacuum verse forceps delivery

From the total of 155 fetuses delivered using vacuum 34(21.9%) of the fetuses had neonatal complication. On the other hand, from the total of 83 fetuses delivered with the assistance of forceps 33(39.8%) developed neonatal complication.

Table 7: Comparing fetal complications between vacuum and forceps delivery in SPHMMC, Addis Ababa, Ethiopia, 2019 (n=238)

Variable	Fetal	Complication	P-value
	Yes n(%)	No n(%)	
Vacuum	34(21.9)	121(78.1)	0.004
Forceps	33(39.8)	50(60.2)	

6. Discussion

This is a cross sectional study aimed to assess the magnitude of complications of instrumental vaginal delivery on mothers and fetuses and factors associated with IVD complications among mothers and neonates delivered in SPMCH, Addis Ababa. This study showed that the proportion of IVD was 7.61%. This result is somewhat lower than the result of a study done in Jimma University which showed the prevalence of IVD to be (10.3%) [37]. Both in the United Kingdom and United States the rates of instrumental vaginal delivery ranges between 10% and 15%; these rates have remained fairly constant [30]. In the RCOG Consultant Conference, the instrumental vaginal delivery rate of 10.5 % was reported with a range of 4-20%. The consensus at the conference was to aim to lower the rate to an average of 8.5% (range 5-15%) [4].

This study showed that the ratio of Vacuum delivery to forceps delivery to be about 2:1. but according to study done at Tikur Anbessa Hospital the ratio is 2:1(Forceps: Vacuum) and also a study done in Jimma university hospital showed forceps to vacuum ratio to be 4:1[30]. This study is in line with the currently increasing proportion of vacuum deliveries which is 1:4[19].

This significant difference from the other studies can be due to the incorporation of recommendations from international guidelines to our practice.

According to this study 152 (63.9%) of the mothers were primiparous. This is consistent with a study done in Suhul hospital, Tigray where 68.3%, were waiting their first baby [3]. Also a study from Jimma university showed that primiparous mothers who had IVD accounted for 69.4% of the cases [30]. In addition study done in India 65% cases were primigravidas [14]. Most authors have reported primigravidas with untested pelvis has high rate of IVD [3].

As described in this study the most common indication for IVD was found to be NRFHRP 113(47.5%). This goes in line with the study done in Tigray where fetal distress was the most common indication of instrumental deliveries, (44.3%) [3]. Also according to the study done in Jimma University NRFHRP was the commonest indication (56.2%) for OVD [37].

The fact that (86.5%) of the fetuses were in OA position in our study is consistent with the study done in Suhul hospital where majority (69%) of the fetuses were in OA position [3].

This study revealed that neonates weighing 2,500- 3,999 gm accounted for 204(85.7%) of the cases. This result was also seen in other studies as well, for instance in a study done in Jimma University (91.3%) of the neonates were having birth weight ranging from 2,500- 3,999 gm [37]. Among mothers included in this study 15.6% of the mother had complication due to instrumental delivery. This is slightly lower than a cross sectional study done in USA where the complication rate was 18.3% [6], a study done in Nepal found that maternal complication to be 17.3% [11]. In addition, other study done in Suhul general hospital, North West Tigray revealed that the magnitude of IVD maternal complication was 59.8% [3]. On the other hand, a study done in zaria revealed that the magnitude of IVD maternal complication was 11.8% [14]. The significant difference from the study done in Suhul hospital could be due to high number of forceps deliveries in that study. Also the above mentioned studies had longer study period with larger sample size.

As seen in this study 45.9% of the mothers had 2nd degree perineal tear. This is almost comparable with a study done in Tigray where the most common morbidity was perineal tear (92.7%) out of which (45.6%) were second degree perineal tear [3]. In the study done at Jimma University genital laceration accounted for (62.5%) [37].

In this study (34.3%) were asphyxiated. This is higher than a study done India that showed (27.4%) were asphyxiated [1]. But compared to the studies done in Jimma and Tigray which showed that asphyxia resulted in (39.3%) and (63%) of the neonates respectively, this result is smaller in percentage. The overall increased number of asphyxiated neonates can be explained by the commonest indication of IVD being NRFHRP in all these studies.

Mothers who delivered with sequential use of ID were 4.82 times more likely to develop complication than those who delivered with the use of one instrument only [AOR=4.82 ;(95%CI= 2.10-27.29)]. Furthermore, Fetuses delivered with sequential use of ID were 6.43[AOR=6.43; (95%CI=1.19-14.73)] time more likely develop fetal complication than those with no sequential use of ID. This is consistent with a study from United States of America which showed increased maternal and perinatal mortality with sequential use of ID [10]. In addition, the sequential use of vacuum and forceps requires particular attention because this sequential use of instruments is associated with a maternal and neonatal risk that is greater than the complications anticipated when only one of the instruments is used [10].

This study found that 28.2% of fetuses delivered through IVD developed complication. This is almost similar with the study done in Zaria which showed neonatal complication to be 29.8 % [19]. It is also consistent with the study from Nepal were 25% of the neonates developed complications [11].

On the other hand this study also revealed that 7.5% of the neonates died after IVD. This goes in line with the study done in Usmanu University, were there was 7% perinatal mortality following IVD [13]. According to a lancet written on perinatal mortality stated that use of instrumental delivery can cause significant fetal morbidity (7.27%) [38].

The other variable that was significantly associated with fetal complication was position of the fetus. The finding of this study indicated that fetal position of LOP were 12.43 times more likely to have fetal complication than those fetuses with DOA [AOR=12.43 ;(95% CI: 2.05-18.76)]

This can be explained by OA is the most common fetal position and complications of instrumental delivery increased with positions other than OA. [34]

Regarding the number of pulls, fetuses born with two pulls were 1.06 times more likely to develop fetal complication [AOR=1.06 ;(95%CI= 1.01-1.59)] and fetuses delivered with three pulls were 1.19 time more likely to develop fetal complication [AOR=1.19 ;(95%CI= 1.05-

1.67)] than those delivered using one pull. This is consistent with a study done in Japan that showed there is an increased fetal complication with two or more pulls (P 0.0033) [35]. It is also stated in literatures that the risk of injury and bleeding increases with prolonged vacuum extractor use [34].

From the finding of this study, both maternal and fetal complications of IVD are more frequent on those who delivered by forceps than those who gave birth by vacuum. This is consistent with a study done in Nigeria which stated that the use of forceps increases the complication of instrumental delivery [13]. Other similar cross sectional study also found that the use of forceps delivery increases maternal morbidity [36]. Also in a comparative study done in Zambia it was stated that vacuum should be preferred over forceps, as it causes much less maternal morbidity and insignificant neonatal morbidities [4]. Inconsistent to this, in a study done in south west Ethiopia revealed that 80% of mothers who gave birth by vacuum are less likely to have favorable neonatal outcome than those with forceps delivery [37].

Conclusion

Overall, maternal and fetal complications of instrumental vaginal delivery among mothers who delivered in SPMCH is high. Sequential use of ID was significantly associated with maternal complication. Whereas position of the fetus, sequential use of ID and number of pulls were significantly associated with fetal complications. Both maternal and fetal complications were higher on participants who delivered using forceps than those delivered using vacuum.

Recommendation

To OBGYN department

- The ratio of forceps to vacuum delivery according to this study is 1:2, but currently vacuum has worldwide acceptance of 1:4 ratio because of its technical simplicity to apply and relatively less maternal trauma with insignificant neonatal morbidities, so using vacuum for IVD should be encouraged.
- There should be an audit of practice.

To health care providers

- From this study it can be concluded that the decision to proceed with an instrumental vaginal delivery whenever spontaneous vaginal delivery is not possible must be based upon weighing maternal and fetal risks.
- Care givers should identify the appropriate candidates for instrumental delivery and should use instruments judiciously.
- Operators should limit the number of pulls and also avoid sequential use of instruments.

To researchers

- Further researches should be conducted on the practice and skill of health care providers and on technical aspects of instrumental delivery.

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Questionnaire for short term maternal and fetal outcomes of instrumental vaginal deliveries at SPHMMC

Section 1: Sociodemographic data of the mother

1. Maternal Card no. _____

2. Age in completed years _____

1. ≤ 19 2. 20-34 3. 35-39 4. ≥ 40

3. Address

€ AA € Amhara € Oromia € Tigray € SNNPR € Others _____

4. Ethnicity

€ Amhara € Oromo € Tigray € SNNPR € Others _____

Section 2: Clinical data of the mother

1. Parity _____

a. P-I b. P- II- V c. P->V

2. Birth weight _____ gm

a. $< 2,500$ gm b. 2,500 gm- 3,999 gm c. $\geq 4,000$ gm

3. Gestational age _____ weeks

- a. 34- 36⁺⁶ weeks
 - b. 37-41⁺⁶ weeks
 - c. ≥ 42 weeks
4. Station of the fetus_____
 - a. Low b. outlet
5. Position of the fetus
 - a. LOA c. ROA e. LOP g. DOA
 - b. ROP d. LOT f. ROT h. DOP
6. Caput
 - a. None c. Mild
 - b. Moderate d. Excessive
7. Molding
 - a. None b. +1 c. +2 d. +3
8. Type of instrument used
 - a. Vacuum
 - i. Metallic ii. Plastic
 - b. Forceps
9. Episiotomy
 - a. Yes € b. No €
10. Duration of second stage _____
11. Number of pulls _____
12. Presentation (face Vs vertex)
 - a. Face€ b. Vertex€
13. Indication for instrumental delivery_____
 - a. Prolonged SSOL€ c. NRFHRP€
 - b. Shorten SSOL € d. Specify _____
14. Catheterization

- a. Yes € b. No €

15. Maternal medical illnesses

- a. Yes € b. No €

16. If 'yes' to question no. 16 specify _____

17. Sequential use of ID

- a. Yes € b. No €

18. Operator

- | | | | |
|-------------|-----------|--------|---------------|
| a. Mid wife | c. Intern | e. RI | g. Consultant |
| b. RII | d. RIII | f. RIV | |

19. Maternal Complications

- a. Second degree laceration €
- b. Third-degree laceration €
- c. Fourth-degree laceration €
- d. Vulvar hematoma€
- e. Vaginal hematoma€
- f. Retro peritoneal hematoma€
- g. Uterine rupture€
- h. Urinary incontinence€
- i. Urinary retention€
- j. Anal incontinence€
- k. Failed Vacuum€
- l. Failed forceps€
- m. PPH Secondary to trauma€
- n. Maternal mortality€
- o. Other, Specify _____

20. Condition upon Discharge

- a. Improved b. Same C. Died

Section 3: Clinical data of the neonate

1. Neonatal referral to ICU

- a. Yes ☐ b. No ☐

2. Neonatal Card no. _____

3. Sex of the neonate

- a. Female ☐ b. Male ☐

4. Fetal complications

- a. Cephalohematoma ☐
- b. Subgaleal hemorrhage ☐
- c. Retinal hemorrhage ☐
- d. subconjunctival haemorrhage ☐
- e. skull fracture ☐
- f. Facial nerve palsy ☐
- g. Scalp lacerations ☐
- h. Asphyxia ☐
- i. Perinatal death ☐
- j. Other, Specify _____

5. Condition of the neonate at 7th day of life

- a. Improved b. Same c. Discharged d. Died