Maternal complication related to instrumental vaginal delivery and its associated factors among mothers who gave birth at Felege Hiwot comprehensive specialized hospital, Northwest Ethiopia. Institutional based retrospective cross-sectional study

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Research note

Keywords: maternal complication, instrumental delivery, Felege hiwot, Bahir Dar

Posted Date: June 27th, 2019

DOI: https://doi.org/10.21203/rs.2.10698/v1

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Version of Record: A version of this preprint was published on August 5th, 2019. See the published version at https://doi.org/10.1186/s13104-019-4530-7.
Abstract

Abstract Objective: the aim of the study was to assess the proportion of maternal complication related to instrumental vaginal delivery and its associated factors among mothers who gave birth in Felege Hiwot comprehensive specialized hospital, northwest Ethiopia. Results: Records of 406 mothers managed with instrumental vaginal delivery were reviewed and 97% of reviewed card had complete documentation. The proportion of maternal complications due instrumental vaginal delivery was found to be 12.1%. A mother who had an episiotomy [AOR=0.14, 95%CI=0.07-0.3], Forceps assisted vaginal delivery [AOR=3.4, 95%CI=1.08-10.67] and primiparity [AOR=3.5, 95%CI=1.26-9.98] were found to be associated with maternal complications related to instrumental vaginal delivery. Keywords: maternal complication, instrumental delivery, Felege hiwot, Bahir Dar

Introduction

Instrumental delivery is applying forceps or vacuum result in vaginal delivery of fetus. This instrumental delivery performed with maternal, fetal or both related condition and any event that threatens the mother or fetus. This procedure begin to perform long ago and count more than two century but pass a number of modification and refinement till now [1, 2] [3].

According to world health organization assisted Instrumental delivery is one component of essential obstetric care so organized and compressive training contributes a lot on reduction of maternal and neonatal morbidity and mortality[4].

In developed countries, complication related with instrumental delivery is not significant as a result of advancement in skill on management of instrumental delivery and accessibility of resources. However, developing countries like Ethiopia, mother and their newborn develop complication and even death do to instrumental delivery. Mostly those problems are avoidable if early interventions are undertaken [5, 6].

Complication due to instrumental delivery can be minor complication like laceration of vagina and perineum and major complication associated with traumatic haemorrhage, bladder injury and pelvic muscle injury [7].

In Developing country there is insufficient evidence generated on the magnitude and factor related with maternal complication of instrumental delivery to plan appropriate strategies. Therefore; this study was aimed to determine the proportion of maternal complications related to instrumental vaginal delivery and its associated factors among mothers who gave birth in felege Hiwot comprehensive specialized hospital, northwest Ethiopia.

Methods

Study design and setting

Facility based retrospective cross-sectional study was conducted at maternity ward of felege Hiwot Comprehensive Specialized Hospital. This hospital is located in bahir dar city which found approximately 565 km North West of Addis Ababa.

The hospital has obstetrics, gynecology, paediatrics, internal medicine, ophthalmology & orthopaedic surgery services. The labor ward gives services to around 612 deliveries per month. The Department of Obstetrics and Gynaecology has a labor ward with seven beds in first stage room, two delivery couches in the second stage room, four beds in the recovery unit and sixty-nine beds in the maternity ward, along with two operating rooms.

SOURCE POPULATION: mothers who had instrumental vaginal delivery in Felege Hiwot comprehensive specialized hospital from December 1, 2015 to November 30, 2017.
STUDY POPULATIONS: mothers who had instrumental vaginal delivery in Felege Hiwot comprehensive specialized hospital from December 1, 2015 to November 30, 2017.

SAMPLE SIZE DETERMINATION:
The sample size was determined by using a single population proportion formula after considering the following assumptions:

Proportion of maternal complication related to instrumental vaginal delivery account for 59.8% from previous studies [8]. By taking 5% Marginal error and 95% Confidence interval, the required sample size was 369. After adding 10% for incomplete secondary data, the final sample size was 406.

SAMPLING PROCEDURE
Mothers who gave birth through instrumental vaginal delivery from Dec1, 2015 to Nov 30, 2017 were 820. Systematic random sampling technique was applied to select the study participant's from records. So to find the sampling fraction; the total number of women who gave birth through instrumental vaginal delivery from Dec1, 2015 to Nov 30, 2017 which was 820 divided by a total number of sample size (406) and it was approximately 2. First, the second woman's chart (record) was selected by lottery method then every other woman's chart was recruited for the study (Fig S1).

INCLUSION AND EXCLUSION CRITERIA

INCLUSION CRITERIA: Medical records of all instrumental deliveries in the hospital from December 1, 2015 to November 30, 2017 were included in the study.

EXCLUSION CRITERIA: incompletely documented chart (chart which does not include all variable) and C/S delivery after failed instrument are excluded.

Socio-demographic, obstetric, enabling and Instrumental delivery related variables
Socio-demographic, obstetric, medical and other factors were examined as a potential predictor in this analysis. Socio-demographic factors include age and place of residence. Obstetric related factors include parity, number of pregnancy, gestational age, BW(birth weight), Fetal presentation/position, station, current pregnancy type, frequency of ANC visit, duration of labour and Obstetric indications for IVD( prolonged second stage, non-reassuring Fetal heart rate pattern, poor maternal effort, APH/abruption, after coming head of breech presentation, MSAF). Enabling factors include the type of hospital visit, instrument available and availability of electronic Fetal monitoring (CTG used). Instrumental delivery related variables include types of instrument, the presence of episiotomy and type of episiotomy.

OPERATIONAL DEFINITIONS
Maternal complication: maternal complication related to instrumental delivery are the presence of at least one of the following (perineal tear, cervical laceration, vaginal laceration, episiotomy extension, traumatic haemorrhage (primary PPH), urinary retention, uterine rupture) [8].

DATA COLLECTION INSTRUMENTS
Data collection checklist was adapted and modified from different studies[8-10].

DATA PROCESSING AND ANALYSIS
Collected data were entered into EPI Info version 7 then exported to SPSS version 23 for analysis. Descriptive statistics used to describe the main features of the data. Bivariate analysis was done to identify candidate variable using p≤ 0.2.
Multivariate logistic regression was used to control effect of confounder and variable with \( p \leq 0.2 \) was included in multivariable logistic regression analysis. Finally statistical significance declared at \( p \)-value<0.05.

**Result**

**Socio-demographic characteristics**
From Four hundred six (406) mothers managed with instrumental vaginal delivery, three hundred ninety seven (97%) of mother's chart was completely documented. Two hundred forty-nine mothers (62.7%) were from urban areas. The mean age was 24.94 ± 4.7 years. Nearly half of, 254(64%) mothers were below 25 years *(table1).*

**Obstetric related characteristics**
Two hundred eighty (70.5%) mothers were primipara. The majority that is three hundred eighty five (97%) had at least one ANC follow *(table1).*

**Obstetric indication for instrumental delivery**
Prolonged 2nd stage was the commonest indication for both forceps and vacuum assisted delivery which accounts 110(33%) and 29(43.9%) respectively *(table 2).*

**The proportion of maternal complication related to instrumental delivery**
The proportion of maternal complication related to instrumental delivery was 12.1% [95%CI= 9.3-15.3]. From the total complication, 91.7% was contributed by forceps-assisted delivery and only 8.3% of complications occur due to vacuum-assisted vaginal delivery.

**Factors associated with maternal complications related to instrumental vaginal delivery**
In the bivariate analysis primiparity, episiotomy, absence of CTG, age of mother, hospital visit type, type of instrumental delivery, low instrumentation were found independently associated with maternal complications related to instrumental delivery. Episiotomy, Primiparity, and forceps-assisted instrumental vaginal delivery were a statistically significant association with maternal complication.

Mother who had episiotomy was 86% less risk for a complication of instrumental delivery than mother who had no episiotomy *[AOR= 0.14, 95%CI =0.07-0.3]*. Mother who had forceps delivery was 3.4 times more likely to develop maternal complication than mother who had vacuum delivery. *[AOR=3.4, 95%CI =1.08-10.67]*. Primipara mother was about 3.5 times more likely risk for a complication of instrumental delivery than multipara mother. *[AOR= 3.5, 95%CI =1.26-9.98] (Table 3)*

**Discussion**
Overall maternal complication related to instrumental delivery was 12.1% with [95%CI =9.3-15.3]. This finding was in line with the finding from Ahmadu Bello University Teaching Hospital Zaria Nigeria (11.8%) [11]. This might be due to due to the similarity in accessibility and service provided.

This finding was higher than the study finding in Detroit, USA (8.1%) [12] and Sweden (9%) [13]. This discrepancy might be due to the difference between the availability of skilled personnel, resources, accessibility of different and modern instrument.

There is significant difference in maternal complications between women delivered by forceps as compared to those delivered by vacuum. Mothers who had forceps delivery were 3.4 times more likely to develop maternal complication than those mothers who had vacuum delivery. This study is in agreement with a study conducted in USA [14] and England [15]. Recently vacuum extraction is most commonly used when an instrument is needed to facilitate vaginal delivery and also this is observed in the different study. Forceps deliveries appear to have lost its fever. This shift in practice may have been
influenced both by the evidence of dramatically reduced maternal trauma with vacuum extraction compared with forceps delivery.

Mothers who had episiotomy were about 86% less risk for maternal complication of instrumental delivery than those who had no episiotomy. This finding was consistent with a study done in Netherlands[16] and USA[17].

Primipara mother was about 3.5 times more likely risk for a complication of instrumental delivery than multipara mother. This might be due to relatively tight perineum in primipara. Another reason might be due to a higher tendency to second stage delays in primigravida mother.

Conclusions

Maternal complication related to instrumental vaginal delivery is high in Felege Hiwot comprehensive specialized hospital. Episiotomy, Forceps assisted vaginal delivery and primiparity were significantly associated with maternal complication related to instrumental delivery. Hence, consider episiotomy while on having instrument-assisted vaginal delivery and decrease use of forceps is recommended. Furthermore, emphasis should be given when applying instrument on primigravida mother and further work is needed to tackle the morbidity experienced by mother in these circumstances.

Limitation

This study shares the limitations of cross-sectional studies and hence may not be possible to establish a temporal relationship between maternal complication due to instrumental vaginal delivery and explanatory variables. Since it was retrospective study, important variables like socio demographic status, body mass index of the mother and sequential use of instrument were not addressed in this study.

Besides, as the study was conducted in a single hospital, the results might not be representative of other institutions.

List Of Abbreviations

ANC: Antenatal Care, APH: Ante Partum Haemorrhage, CS: Caesarean Section, FHCSH: Felege Hiwot Comprehensive Specialized Hospital, IVD: Instrumental Vaginal Delivery, OVD: Operative Vaginal Delivery, PPH: Postpartum Haemorrhage

Declaration

Ethical consideration

The data collection was carried out after getting approval for the project proposal from the ethical review board of Bahir Dar University College of medicine and health science. Official letter was obtained from the Amhara public health institute and permission from Felege Hiwot Referral Hospital director, obstetric ward case team coordinator and card room coordinator. Confidentiality of the information was assured from all the data collectors and investigators sides. The checklist was administered anonymously.

Consent for publication

Not applicable in this study

Availability of data and materials

The datasets used in this study are available from the corresponding author on reasonable request.
Competing interests

The authors declared that they have no competing interests.

Funding

We are grateful to Bahir Dar University College of medicine and health science for their financial support. However, beyond financial support, the founders did not have any role in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

Authors’ contributions

SB wrote the proposal, gives training on data collection, analyzed the data and drafted the paper. DA, SK, and SA approved the proposal with some revisions, participated in data analysis and manuscript writing. All authors read and approved the final manuscript.

Acknowledgments

The authors are glad to thanks Bahir Dar University College of medicine and health science. Our gratitude also goes to Felege Hiwot referral hospital card room staffs and data collectors.

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**Tables**

**Table 1**: socio-demographic and Obstetrics related characteristics of women who undergone instrumental deliveries at FCSH from December 1, 2015 to November 30, 2017.
| Variables                  | Frequency | Percent |
|---------------------------|-----------|---------|
| **Age**                   |           |         |
| <25                       | 254       | 64.0    |
| 25-35                     | 128       | 32.2    |
| >35                       | 15        | 3.8     |
| **Place of residence**    |           |         |
| Urban                     | 249       | 62.7    |
| rural                     | 148       | 37.3    |
| **Parity**                |           |         |
| Primipara                 | 280       | 70.5    |
| Multipara                 | 117       | 29.5    |
| **ANC visit**             |           |         |
| Yes                       | 385       | 97      |
| No                        | 12        | 3       |
| **Hospital visit type**   |           |         |
| Referral                  | 141       | 35.5    |
| Direct visit              | 256       | 64.5    |
| **Gestational age**       |           |         |
| Pre-term                  | 7         | 1.8     |
| Term                      | 368       | 92.7    |
| Post-term                 | 22        | 5.5     |
| **Types of instrumental delivery** | | |
| Forceps delivery          |           |         |
| Vacuum delivery           | 332       | 83.6    |
|                           | 65        | 16.4    |
| **Type of instrumentation**    |           |         |
| Mid                       | 39        | 9.8     |
| Low                       | 215       | 54.2    |
| Outlet                    | 143       | 36.0    |
| **Birth weight**          |           |         |
| <2500                     | 60        | 15.1    |
| ≥2500                     | 337       | 84.9    |
| **Fetal position**        |           |         |
| OA                        |           |         |
| OT                        | 334       | 84.2    |
|                           | 43        | 10.8    |
Table 2: Obstetric indications for instrumental vaginal delivery at FHCSH from December 1, 2015 to November 30, 2017

| Indication                        | Forceps | vacuum  |
|-----------------------------------|---------|---------|
| Prolonged second stage            | 110(33%)| 29(43.9%)|
| Fetal distress                    | 100(30%)| 22(33.3%)|
| Maternal exhaustion               | 99(29.7%)| 11(16.7%)|
| PE/E                              | 16(4.7%)| 3(6.1%) |
| Other (GIIIMSAF, APH/abruption, prophylactic forceps) | 7(2.6%) | -       |

Table 3: Factors associated with maternal complications related to instrumental vaginal deliveries in binary & multiple logistic regressions at FHCSH from December 1, 2015 to November 30, 2017
| Variables | Maternal Complication | COR(95%CI) | AOR(95%CI) | p-value |
|-----------|-----------------------|------------|------------|---------|
| **Is CTG available** | | | | |
| Yes | 198 | 20 | 1 | 1 |
| No | 151 | 28 | 0.55[0.3-1.0] | 0.68[0.34-1.33] | 0.266 |
| **Types of instrumental delivery** | | | | |
| Forceps | 288 | 44 | 3.4[1.08-10.67] | 0.034* |
| Vacuum | 61 | 44 | 2.33[0.81-6.73] | 0.034* |
| **Does she had episiotomy** | | | | |
| no | 53 | 19 | 0.27[0.14-0.52] | 0.000* |
| Yes | 296 | 29 | 0.14[0.07-0.3] | 0.000* |
| **Does she Had HTN** | | | | |
| no | 327 | 38 | 1 | 1 |
| Yes | 22 | 10 | 0.26[0.15-2.84] | 3.7(0.4-31.) | 0.23 |
| **Birth weight** | | | | |
| <2500 | 50 | 10 | 1 | 1 |
| ≥2500 | 299 | 38 | 0.64[0.29-1.35] | 1.41[0.6-3.31] | 0.43 |
| **Age of the mother** | | | | |
| <25 | 216 | 38 | 1 | 1 |
| 25-35 | 119 | 9 | 0.37[0.17-0.81] | 2.5[0.26-23.38] | 0.44 |
| >35 | 14 | 1 | 0.4[0.05-3.08] | 0.8[0.08-7.76] | 0.85 |
| **Parity** | | | | |
| Primipara | 238 | 42 | 3.3[1.34-7.9] | 3.5[1.26-9.98] | 0.017* |
| Multipara | 111 | 6 | 1 | 1 |
| **ANC follow up** | | | | |
| no | 9 | 3 | 0.4[0.104-1.52] | 2.82[0.6-13.14] | 0.186 |
| yes | 340 | 45 | 1 | 1 |
| Hospital visit type |   |   |   |   |
|--------------------|---|---|---|---|
| Referral           | 117 | 24 | 1.98[1.1-3.64] | 1.58[0.81-3.06] | 0.17 |
| Direct visit       | 232 | 24 | 1 | 1 |

| Fetal station |   |   |   |   |
|---------------|---|---|---|---|
| Mid           | 37 | 2 | 1 | 1 |
| Low           | 188 | 27 | 0.35[0.08-1.58] | 0.2[0.04-1.05] | 0.06 |
| Outlet        | 124 | 19 | 0.94[0.5-1.76] | 1.02[0.5-2.06] | 0.96 |

*p-value<0.05

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