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Research Article

Success Rate and Associated Factors of External Cephalic Version in University of Gondar Teaching Comprehensive Specialized Hospital

Abstract

Introduction: Breech presentation occurs in approximately 3–4% of term pregnancies and is associated with high cesarean delivery rates, which contribute to increased perinatal morbidity and mortality. External Cephalic Version (ECV) is an obstetric procedure involving the application of external pressure to the abdomen to turn the fetus to a vertex presentation. ECV is considered a safe and effective method for reducing breech presentations and decreasing cesarean delivery rates. This study aims to evaluate the success rate of ECV and identify factors associated with its success in pregnant women at the University of Gondar Specialized Hospital.

Objective: The objective of this study was to determine the success rate of ECV and the factors associated with its success among pregnant women with breech or other malpresentations at the University of Gondar Specialized Hospital, Northwest Ethiopia, in 2022.

Methods: An institution-based cross-sectional study was conducted from December 2021 to September 2022 at the University of Gondar Specialized Hospital. A total of 174 pregnant women with breech or malpresentation after 36 weeks of gestation who met the inclusion criteria were included. Data was collected and verified for completeness and accuracy, then entered into EpiData version 4.6 for coding and analysis. The data analysis was performed using SPSS version 25, with both bivariate and multivariate logistic regression models employed to assess associations between independent and dependent variables. Adjusted Odds Ratios (AOR) with 95% confidence intervals were calculated, and a p-value of <0.05 was considered statistically significant.

Results: The success rate of ECV was 58.6%. Factors significantly associated with a successful ECV included:

- A lax or thin abdominal wall (AOR 0.039, 95% CI: 0.003–0.453).
- Palpability of the fetal head during the procedure (AOR 0.139, 95% CI: 0.024–0.794).
- An anterior placental location was associated with ECV failure (AOR 6.94, 95% CI: 1.404–34.318).
- The forward roll technique (AOR 0.149, 95% CI: 0.048–0.460) was found to increase the likelihood of success.

Discussion: The success rate of ECV in this study (58.6%) is consistent with similar studies conducted in other regions. Factors such as a lax or thin abdominal wall, posterior placental location, and fetal head palpability were found to positively influence the success of ECV, as similarly reported in the literature. The forward roll technique, which was associated with higher success rates, may be recommended for use in clinical practice. The presence of an anterior placenta, on the other hand, was a significant predictor of ECV failure. These findings underline the importance of assessing these factors prior to attempting ECV.

Conclusion: The success rate of ECV in this study was 58.6%, which is comparable to previous research and standard medical literature. Factors significantly associated with successful ECV include a lax or thin abdominal wall, posterior placental location, fetal head palpability, and the forward roll technique. These findings can guide clinicians in improving the outcomes of ECV procedures for breech and malpresentation pregnancies.

Keywords: Malpresentation, External Cephalic Version (ECV), Breech presentation, Cesarean delivery, ECV success rate.

Acronyms and Abbreviations

AF: Amniotic fluid, ACOG: American college of obstetricians and gynecologists, AFI: Amniotic: fluid index, ANC: Antenatal care, CD: Cesarean delivery, CI: Confidence interval, CM: Centimeter, CS: Cesarean section, CST: Contraction stress test, CTG: Cardiotocography, ECV: External cephalic version, DM: Diabetes mellitus, EFM: Electronic fetal monitoring, ETB: Ethiopian birr, FHR: Fetal

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heart rate, FHRP: Fetal heart rate pattern, IUFD: Intrauterine fetal death, IUGR: Intra uterine growth restriction, KG: Kilogram, BMI: Body mass index, RCOG: Royal college of obstetricians and gynecologists

Background

The Cesarean Section (CS) rate has been steadily increasing worldwide, exceeding 50% of all births in some countries. Given that CS is associated with severe complications, the rising rates contribute to an increase in maternal mortality. In low- and middle-income countries, the maternal mortality rate related to cesarean sections is 8 per 1,000 procedures, while in more developed countries, the rate is 16 per 100,000 births. Breech presentation occurs in approximately 3–4% of term pregnancies, and breech presentations are associated with higher cesarean birth rates [1]. Breech delivery increases the incidence of perinatal morbidity and mortality, posing significant challenges to obstetric management [2]. External Cephalic Version (ECV) is an obstetric procedure that involves applying external pressure to the woman's abdomen to rotate the fetus into a vertex presentation, either through a forward or backward roll [1]. ECV is a safe and effective method for reducing the occurrence of breech presentations at term, thereby lowering the cesarean delivery rate for this indication [2]. ECV is considered a safe procedure, with a reported risk for emergency cesarean section within 24 hours being as low as 0.5% [2]. It can be performed for various malpresentations of the fetus, such as breech, transverse, and oblique presentations. ECV was first described in 1807 by Wigand and later popularized by Tarnier and Pinard in 1878 [2]. One ECV technique involves lifting the breech upward from the pelvis with one hand while applying pressure on the fetal head with the other hand to achieve a forward roll. If the forward roll fails, a backward roll may be attempted. ECV can be performed by one or two practitioners, and intermittent use of ultrasonography during the procedure allows for real-time evaluation of fetal heart rate and position. The procedure should be abandoned if there is prolonged fetal bradycardia, patient discomfort, or difficulty in completing the maneuver [2]. After attempting ECV, the fetus should be reevaluated, and the patient should be monitored for at least 30 minutes, or longer if clinically necessary. For Rh-negative patients, Anti-D immunoglobulin is administered if delivery is not anticipated within the next 72 hours. There is no evidence supporting the routine practice of inducing labor immediately after an ECV attempt to prevent reversion [1].

Statements of the problem

Breech presentation occurs in approximately 3–4% of term pregnancies, and there is a high cesarean delivery rate for breech presentation [1]. Most of these patients will be delivered by cesarean section. It is believed that the overall cesarean delivery rate is higher than necessary, and efforts to prevent the first cesarean section often present obstetricians with the challenge of reducing the number of cesareans they perform [3]. Over the last decade, cesarean deliveries have increased from approximately 23% to 34%, with malpresentation being the third most common indication (approximately 17%). External cephalic version (ECV) is an important intervention that can help reduce this rate (3). Breech delivery is associated with higher rates of perinatal morbidity and mortality, and it presents a significant challenge to obstetric management (3). In 2000, the Term Breech Trial (TBT) reported a significant reduction in perinatal morbidity and mortality for breech babies delivered by planned cesarean, estimating an excess mortality of 1% with planned vaginal breech birth. The trial also found little alteration in maternal morbidity and concluded that perinatal outcomes were worse for babies delivered vaginally compared to those delivered by cesarean section [4]. As a result, ECV is widely advocated. However, its implementation varies, with an estimated 20–30% of eligible women not being offered the procedure. Attempting ECV reduces the number of non-cephalic births and cesarean deliveries, thereby decreasing complications associated with breech births and the maternal and fetal morbidity linked to abdominal deliveries. This is particularly important in women with an unscarred uterus, as avoiding a first cesarean birth reduces the likelihood of requiring repeat cesareans and lowers the risk of complications such as abnormally invasive placenta in future pregnancies [2]. The reported success rates of External Cephalic Version (ECV) vary widely in the literature, ranging from 17% to 86%. This variability may be attributed to differences in geographic settings, study designs, and sample sizes. Many of the studies were clinical trials, and most population-based studies had small sample sizes. The uncertainty around success rates, coupled with the perception of ECV as a painful and potentially hazardous procedure, has led up to 76% of patients to decline the procedure. Identifying factors associated with successful ECV outside of clinical trial settings could help improve the decision-making process by providing women with more realistic expectations of success (6). Women who underwent successful ECV had lower hospital charges, shorter lengths of stay, and reduced odds of developing complications such as endometritis, sepsis, and prolonged hospital stays (i.e., >7 days) compared with women with persistent breech presentations (1). Despite the benefits, ECV has physical, emotional, and financial costs. Studies have reported complications associated with the procedure, including abnormal fetal cardiotocography in 6% of cases. Additionally, 35% of women who underwent ECV found the procedure painful. The emotional impact on women should not be underestimated, as many report feeling anxious prior to the procedure. The most common complications associated with External Cephalic Version (ECV) are fetal heart rate abnormalities, which occur in 4.7% of cases. However, these are usually transient and resolve upon completion or abandonment of the procedure. More severe complications occur in less than 1% of

cases and include emergency cesarean section, premature rupture of membranes, cord prolapse, vaginal bleeding, placental abruption, fetomaternal hemorrhage, stillbirth, and premature labor [3]. While ECV is routinely offered in some developed countries, it is less commonly practiced in developing regions, particularly among younger obstetricians. This is mainly due to an inordinate fear of the procedure's risks, compounded by a lack of necessary skills and experience. Consequently, there is limited published literature on ECV from developing countries [7]. Although complications are rare, ECV should only be attempted in settings where emergency cesarean section facilities are readily available. For this reason, some practitioners prefer to perform ECV in the operating room, though this is not universally required [3]. The American College of Obstetricians and Gynecologists (ACOG) recommends offering ECV to women with breech fetuses who have no contraindications to the procedure and have reached 36 weeks of gestation. This timing helps avoid complications related to prematurity if an urgent cesarean section is necessary [2]. With the restrictive practice of breech vaginal delivery over the past 15 years, national organizations like the Royal College of Obstetricians and Gynecologists (RCOG), the Society of Obstetricians and Gynecologists of Canada (SOGC), the Royal Australian and New Zealand College of Obstetricians and Gynecologists (RANZCOG), and the International Federation of Gynecology and Obstetrics (FIGO) have updated their guidelines. These organizations now recommend ECV at term to help limit the rise in elective cesarean sections for term breech presentations (4). Despite being routinely offered in developed countries, ECV remains underutilized in regions like Sub-Saharan Africa, where data on its success rate is also scarce. Therefore, this research is aimed to determine the success rate of ECV and its associated factors among pregnant women with malpresentation after 36 weeks of gestation.

Literature Review

Success rate of ECV

Different researches have been conducted to discover the success rate of External Cephalic Version (ECV) and the associated factors influencing its success. According to the updated ACOG practice guidelines for ECV, and based on a recent meta-analysis, the success rate of this procedure ranged from 16% to 100%, with a pooled success rate of 58%. Similarly, the RCOG recommends that about 50% of ECV attempts will be successful [1]. According to the SOGC guidelines, the procedure results in a cephalic presentation in approximately 60% of cases [8]. In studies conducted in Germany, 1,379 women underwent an ECV attempt, with 895 (64.9%) being successful. A recent study in Israel involving 250 pregnant women opting for a trial of ECV by a single operator reported a success rate of 64.8% [9]. A 10-year retrospective study at the Coombe Women and Infants University Hospital (CWIUH), one of the largest maternity hospitals in Ireland and Europe, reviewed 604 women who underwent an ECV, and 329 (54.5%) had a successful ECV [2]. A study conducted in the Czech Republic involving 478 cases showed a 48.7% success rate [11]. In a study conducted in the Netherlands in 2015, among 2,318 women who underwent the ECV procedure, 1,093 (47.2%) had a successful ECV [8]. One of the largest data sets on the success of ECV comes from the USA, where a cross-sectional analysis of 51,001 ECV cases (2010–2014) documented a 58.5% success rate [8]. A large prospective study from the UK analyzing 2,614 women who underwent ECV showed a 47% success rate [12]. A Malaysian study, reviewing 142 cases, reported a 51.4% success rate [13]. Studies conducted in Washington State between 2003 and 2014, involving 4,981 ECV attempts, found a success rate of 57.2% [6]. Similar results were seen in Sweden, where a study involving 2,331 women reported a success rate of 53.4% (14). In Spain, however, a study involving 320 patients found a significantly higher success rate of 82.5% [15]. In Africa, a study conducted at a Nigerian hospital involving 111 mothers undergoing ECV found a success rate of 66.7% [7]. Additionally, a study conducted in Ethiopia at Saint Paul's Medical College, involving 152 mothers, reported a success rate of 71.1% [8]. Overall, the success rates of ECV vary globally, with rates ranging from as low as 47% to as high as 82.5%, depending on geographic location, sample size, and procedural factors.

Associated factors for successful ECV

Success rates depend on multiple variables like sociodemographic factors, maternal characteristics and current obstetric conditions. It is likely that case selection considerably affects success rates.

Sociodemographic factors

There was no statistically significant difference in socio-demographic characteristics distribution between those mothers who had successful ECV and those who had unsuccessful ECV (2, 6-9, 11, 16-25). A retrospective study done in Israel Sourasky medical center which involves around 250 ECV shows that the mean maternal age was higher in the successful ECV group compared with the unsuccessful ECV group [9].

Maternal characteristic

A cross-sectional study done at university of Minnesota, USA which involves a total of 51,002 ECV the ECV success rate for the entire study population was 65.3%. There was a decreasing success rate for ECV as BMI increased. Women with a normal BMI had a 65.0% success of ECV while women with a BMI >29.9 kg/m2 had a

63.9% success of ECV, which was significantly lower. Most notably, women with a BMI of 40 kg/m2 or greater had a successful ECV 58.5% of the time [19]. Another retrospective study done in Israel Sourasky medical center which involves around 250 ECV, Patients with BMI greater than 29, had a low probability for version success, regardless of fore-bag size(9). Some literatures shows that there is a decreasing success rate for ECV as BMI increased [2, 9, 19, 21, 26]. Women with BMI less than 18.5 kg/m2 accounted 3.6% of the population, 18.5–24.9 kg/m2 accounted for 47.2%, 25.0–29.9 kg/m2 accounted for 25.4%, 30–34.9 kg/m2 accounted for 13.5%, 35–39.9 kg/m2 accounted for 6.2%, and greater than 40 kg/m2 accounted for 4.2% [11, 14, 17, 19]. Patients with BMI greater than 29, had a low probability for version success(27, 28). According to some literatures thin or lax abdominal wall was significantly associated with successful ECV [8, 21].

Current obstetric conditions

In a meta-analysis, RCOG showed that multiparity, non-engagement of the breech, use of tocolysis, a palpable fetal head, posterior placental location, complete breech position, and an amniotic fluid index greater than 10 are predictors of successful ECV [29]. In the literature, various factors have been identified as predictors of ECV success. A study in France and Hong Kong found that an unengaged breech presentation is an important predictor of successful ECV [2]. A Randomized Controlled Trial (RCT) conducted at McMaster University in Hamilton, ON, showed that having a very or moderately mobile fetus, relaxed uterine tone, a fetal head that was easy to palpate, multiparity, and a non-engaged presenting part were associated with ECV success [21]. A secondary analysis of a multicenter, open-label randomized controlled trial conducted at the Academic Medical Center in Amsterdam, The Netherlands, involving 818 women who underwent ECV, found that the administration of tocolysis, posterior placenta, and adequate amniotic fluid were the most important predictors positively affecting the success of the procedure [30]. A prospective study conducted at the Nigerian University Teaching Hospital, involving 183 singleton breech presentations at term, identified favorable factors for success, including multiparity, flexed breech, unengaged breech, normal liquor volume, and a posterior placenta [7]. A study at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia, involving 152 ECVs, showed that multiparity, absence of pain during the procedure, posterior placenta, unengaged breech, soft uterine tone, and a thin abdominal wall were significantly associated with ECV success [8].

Conceptual Frame work

See Figure 1.

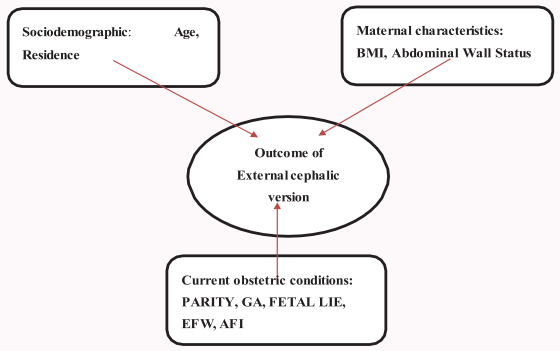

Figure 1: Conceptual Framework of the Study.

Justifications

In a meta-analysis, RCOG showed that multiparity, non-engagement of the breech, use of tocolysis, a palpable fetal head, posterior placental location, complete breech position, and an amniotic fluid index greater than 10 are predictors of successful ECV [29]. In the literature, various factors have been identified as predictors of ECV success. A study in France and Hong Kong found that an unengaged breech presentation is an important predictor of successful ECV [2]. A Randomized Controlled Trial (RCT) conducted at McMaster University in Hamilton, ON, showed that having a very or moderately mobile fetus, relaxed uterine tone, a fetal head that was easy to palpate, multiparity, and a non-engaged presenting part were associated with ECV success [21]. A secondary analysis of a multicenter, open-label randomized controlled trial conducted at the Academic Medical Center in Amsterdam, The Netherlands, involving 818 women who underwent ECV, found that the administration of tocolysis, posterior placenta, and adequate amniotic fluid were the most important predictors positively affecting the success of the procedure [30]. A prospective study conducted at the Nigerian University Teaching Hospital, involving 183 singleton breech presentations at term, identified favorable factors for success, including multiparity, flexed breech, unengaged breech, normal liquor volume, and a posterior placenta [7]. A study at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia, involving 152 ECVs, showed that multiparity, absence of

pain during the procedure, posterior placenta, unengaged breech, soft uterine tone, and a thin abdominal wall were significantly associated with ECV success [8].

Objectives

General objectives

To determine the success rate of ECV and its associated factors among pregnant women with malpresentation after 36 weeks of gestation in University of Gondar specialized hospital, Gondar, Ethiopia, 2022.

- Specific objectivesTo determine success rate of external cephalic version.
- To assess factors associated with successful external cephalic version.

Materials and Methods

Study Area and period

The study was conducted in University of Gondar specialized hospital, found in Gondar town, which is the capital town of the central Gondar administrative zone, located 743kms northwest of Addis Ababa. University of Gondar specialized hospital is one of the biggest tertiary level referral and teaching hospitals in the Amhara Regional State. According to records from the hospital's information center, every year more than 200,000 people visit the hospital which serves as referral hospital for more than 7million people in the surrounding catchment area.University of Gondar comprehensive specialized hospital department of gynecology and obstetrics run one labor and delivery ward, three postpartum maternity ward, one high risk ward, one gynecology ward, one Urogynecologic ward , four gynecologic OPD, four antenatal clinics and Michu clinic. The study was conducted from December 2021 to September, 2022.

Study Design

An institutional based cross-sectional study design was used to assess success rate of ECV and it's associated factors in an Ethiopian setting among women at University of Gondar specialized hospital, northwest Ethiopia, 2022.

Source Population

All pregnant women who visited University of gondar comprehensive specialized hospital and the three affiliated health centers (Poly health center, Maraki Health center and Mulu maternity).

Study population

The study population consist pregnant women with Breech presentation or transverse lie at ≥ 36-week gestation seeking obstetric services at the University of Gondar Referral Hospital and three health centers working in collaboration with university of Gondar.

Eligibility criteria

Inclusion Criteria

- All Pregnant women with singleton fetus with malpresentation at or near term with gestational age ≥36 and no contraindications to ECV.

Exclusion Criteria

- Multiple pregnancy
- Clotting disorders.
- Previous cesarean section
- RH isoimmunization
- Obstetric complications (preeclampsia, GDM, APH…)
- Other medical illness (diabetes, hypertension…)

Sample size determination and sampling procedure

The sample size will be estimated using single population proportion formula. By considering, 95% confidence level, 5% margin of error and the success rate of ECV 71.7% in a study done at Saint Paulos medical college, Addis Ababa, Ethiopia 4 years back and 10% of non-responsive rate a total of 342 participant will be selected.

The required sample size is calculated using a single population proportion formula:

$n = (Z\alpha/2)^2 P (1-P)/d^2$

$n= (1.96)^2 \times 0.717 (1-0.717)/(0.05)^2$

n = 311 after adding 10% non-respondent rate final sample size will be 342

But, the target population in the study area were less than 10,000 (N=450). So, in this situation finite population correction adjusts (n) was performed for final sample. So: The target population (N) was 450

n= $no/(1+\frac{no}{n}) = \frac{342}{1+\frac{342}{450}} =$ **194**

So, final prevalence sample size of the study was **194**

Where n = minimum sample size required for the study

Z= standard normal distribution (Z=1.96) with confidence interval of 95% and α=0.05

P= taking p value -------- and margin of error (d) 0.03

Sampling technique

The study was conducted among pregnant women who visited University of Gondar comprehensive specialized referral hospital (UOGCSRH) and the three affiliated health centers for Antenatal care during the study period. Using this referral system, all cases of fetal malpresentation, whether Breech or Transverse lie from any of these affiliated health centers was sent to UOGCSRH where further evaluation and subsequent were given by the team of maternal fetal medicine fellows. Sample was collected until calculated sample size was reached within the study period but all the samples collected within the study period were analyzed.

Data collection procedures

Questionnaires

Data was collected using pre-tested structured interviewer administered questionnaire, which include questions of socio-demographic, obstetric, medical factors which consist of both open and closed ended questions. The questionnaire was prepared in English then translated into Amharic. In order to check the consistency, the Amharic version of the questionnaire will then be translated back to English.

Clinical examination

All consecutive referrals of cases of fetal malpresentation were approached and assessed for study eligibility. Eligible patients comprised of those who are equal to or greater than 36 weeks gestation. This is because if an emergency condition necessitating an emergency delivery following the procedure happens, this gestational age will be a reasonable approach in the reduction of iatrogenic prematurity complications. Maternal abdominal condition was checked for laxity, if the abdominal condition is tense, Oral Nifedipine of 20mg will be provided 30min-1hour prior to the procedure and if it is lax enough the procedure will be proceeded without providing Nifedipine. On the day of the scheduled ECV, eligible participants had an ultrasound scan with the goals of estimating fetal weight, determining type of breech; placental location; and amount of amniotic fluid. The ECV procedure was carried out under ultrasound guidance, with the woman in slight Trendelenburg position and a ready emergency CS operating theatre in case emergency condition happens. Fetal heart was monitored with CTG before and after the procedure. A change from podalic to cephalic presentation or from transverse to a cephalic longitudinal lie was checked by physical examination and an ultrasound. Data was collected on the day of the procedure by trained data collectors. The principal investigator or the fetomaternal team who was going to perform the procedure was supervising the data collection for the utmost quality.

Study variables

Dependent variables

Outcome of ECV.

Independent variables

Socio demographic Factors:

- Age
- Residency

Current Obstetric Conditions:

Gestational age (GA)

- Amniotic fluid volume (AFV)
- Direction of fetal back
- Estimated fetal weight
- Palpation of fetal head
- Uterine tone
- Type of malpresentation
- Parity
- Engagement of fetal head
- Placental location

Maternal Characteristics

- Body mass index (BMI)
- Abdominal wall strength

Operational definitions

Successful ECV- The fetus is successfully inverted to vertex ()

Failed ECV- 30 minutes of fetal manipulation had elapsed, ()

- The patient asked to stop the procedure owing to pain or any other reason, or

- The practitioner decided that continuing the procedure would be of no benefit.

Data processing and analysis

Each completed data was checked for completeness before data entry. Then the data were coded & entered in to a computer by using EPI data version 4.6 and further clean-up was made to check accuracy and consistency. Then data was exported to SPSS version 25 for analysis. Bivariate analysis was carried out first to observe the crude association between independent and dependent variables. Multivariable logistic regression model was constructed for those p value <0.2 on bivariate analysis to identify covariates significantly associated with the outcome variable. Statistical significance was declared at P-value <0.05 and the AOR with 95% confidence level were used to determine the strength of association.

Data quality control

Training was given to the data collectors by principal investigators and Supervision of data collection was done by the principal investigator. Questioners were checked every day by investigator for completeness.

Ethical consideration

Ethical approval was obtained from the ethical review committee of Institutional Review Board of University of Gondar. With this clearance, a formal approval was sent and the permission for conducting the study was secured from the administration of GUH and the head of the department of gynecology and obstetrics before commencing the study. Informed consent was obtained from each study participant and introduced the objective of the study that it contributes to set interventions and strategies to improve services.

Results

Sociodemographic characteristics of the study population

In this study a total of 174 pregnant mothers were participated with a response rate of 100%. The majority of the participants were in the age group between 25-29 representing 70(40.2%) of the total participants while the least participants are those of the age group between 15-19 years with taking 7(4%) and the mean age of the participants were calculated to be 26.8±4.339years. Among all study participants the majorities (72.4%) are urban dwellers and 27.6% of the study participants came from rural area (Table 1).

Obstetrics characteristics of the study participants

Among all the study participants 55(31.6%) are nulliparas and 119(68.4%) are multiparous. From all participants 85.6% have a known gestational age calculated from either reliable date or an early ultrasound and from this the majorities (59.7%) were from 36weeks to 38weeks plus 6days and 25(14.4%) of the study participants were with unknown gestational age taken as 9month of amenorrhea. All the study participants had ANC and majorities had ANC follow up at local health center 98(56.3%) followed by GUH 68(39.1%) and private

Table 1: Socio-demographic characteristics.

Socio demographic characteristics of participants		Frequency	Percent (%)
Age group (Years)	15-19	7	4.0
	20-24	47	27.0
	25-29	70	40.2
	30-34	40	23.0
	≥35	10	5.7
Residency	Urban	126	72.4
	Rural	48	27.6

Table 2: Obstetrics history of the study participants.

Obstetrics history of the study participants		Frequency	Percent (%)
Parity	Nullipara	55	31.6
	Para 2 and above	119	68.4
GA	36-38	89	51.1
	39-40	48	27.6
	41-42	12	6.9
	Unknown (9 month of amenorrhea)	25	14.4
ANC	LHC	98	56.3
	UOG	68	39.1
	PRIVATE	8	4.6

clinic 8(4.6%) (Table 2).

Maternal characteristics of the study participants

Among the entire study participants majority 101(58%) had a normal BMI (18.5-24.9kg/m^2) and the rest of the participants 73 (42%) had a BMI of greater than 25kg/m^2. Majorities 154(88.5%) of the study participants had week or normal abdominal wall status whereas the rest 11.5% of the study participants had strong or tense abdominal wall status. In 84.5% of the study participants the uterus was found to be lax (Table 3).

Obstetrics ultrasound characteristics of the study participants

Among all the study participants majorities 159(91.4%) had breech presentation and of the study participants with breech presentations 119(74.8%) were complete breech. Furthermore, majority 95(54.6%) of the fetal back were on the left side of the mother. From the study participants with transverse lie which account for 8.6% two third of them were back down and a third of them were back up. The majority 158(90.8%) of the fetuses had estimated fetal weight from 2.5kg-3.5kg during the procedure and the fetal sex distribution were comparable accounting 49.6% and 50.4% for male and female respectively. From all the study participants the majorities 161(92.5%) had a normal amniotic fluid index measuring 8-25cms and 58.6% of the study participants had fore bag fluid of more than 1cm. For the majority 79(45.4%) of the study participants the placenta was located posteriorly however anterior placentation and fundal placentation were accounted 25.3% and 29.3% of the placentation's respectively (Table 4).

Procedure related characteristics of the study participants

Tocolytic were administered for only 3.4% of the study participants before the procedure. And the operators use forward roll technique in 41.1% the study participants, backward roll technique in 8.0% study participants and they use both techniques one after the other in 50.6% the study participants. In 30.5% of the procedure, they

Table 3: Maternal characteristics of the study participants.

Maternal characteristics of the study participants		Frequency	Percent (%)
BMI	18.5-24.9	101	58.0
	≥25	73	42.0
Abdominal wall status	thin/lax	154	88.5
	Strong/tense	20	11.5
Uterine tone	Lax	147	84.5
	Intense	27	15.5

Table 4: Obstetrics ultrasound characteristics of the study participants.

Obstetrics ultrasound characteristics of the study participants		Frequency	Percent
Fetal lie	Breech	159	91.4
	Transverse	15	8.6
Type of breech	Frank	40	25.2
	Complete	119	74.8
If transverse	Back up	5	33.3
	Back down	10	66.7
Direction of fetal back	Front	22	12.6
	Left	95	54.6
	Right	46	26.4
	Unknown	11	6.3
EFW	2500-3499	158	90.8
	≥3500	16	9.2
Fetal sex	Male	86	49.4
	Female	88	50.6
AFI	AFI<8	13	7.5
	AFI 8-25	161	92.5
Placental location	Anterior	44	25.3
	Posterior	79	45.4
	Fundal	51	29.3
Forebag	≤1cm	72	41.4
	>1cm	102	58.6

Table 5: Procedure related characteristics of the study participants.

Procedure related characteristics of the study participants		Frequency	Percent
Tocolytic	Given	6	3.4
	Not given	168	96.6
Engagement	Engaged	69	39.7
	Not engaged	105	60.3
Fetal head	Palpable	158	90.8
	Not palpable	16	9.2
Technique	Forward	72	41.1
	Backward	14	8.0
	One after the other	88	50.6
Number of attempts	once	53	30.5
	2-3	65	37.4
	multiple	56	32.2

attempt once whereas in 32.2% of the procedure the tried multiple attempts. In addition to this in 60.3% of the study participants the presenting part were not engaged. In the majority (90.6%) of the study participants the fetal head were palpable (Table 5).

Outcome of the external cephalic version procedure

Among all the study participants for whom external cephalic version procedure was done, the procedure was successful in 102(58.6%) of participants and in 72(41.4%) the procedure was failed to effect in a successful cephalic version (Table 6).

Bivariate and multivariate logistic regression analysis of success rate of ECV and associated factors

All variables were analyzed using bivariate analysis to assess the association between the variables and success rate of external cephalic version. Then, variables that show P value less than or equal to 0.2 in bivariate analysis were taken to multivariate analysis. Out of those variables treated under multivariate analysis: abdominal

Table 6: Outcome of the external cephalic version procedure.

Outcome of the external cephalic version procedure	Frequency	Percent
Successful external cephalic version	102	58.6
Failed external cephalic version	72	41.4

Table 7: Bivariate and multivariate logistic regression analysis of success rate of ECV and associated factors

Variable		Outcome of ECV		95 percent CI		
		YES Frequency (%)	NO Frequency (%)	COR	AOR	P-value
Parity	Primigravid	28(50.9)	27(49.1)	1.56(0.831-3.024)	0.841(0.318-2.553)	0.739
	Parous	74(62.2)	45(37.8)	1		
GA	36-38	59(66.3)	30(33.7)	0.468(0228-0.958)	0.696(0.243-1.993)	0.499
	UK	17(68.0)	8(32.0)	0.433(0.157-1.193)		
	41-42	3(25.0)	9(75.0)	2.760(0.664-11.465)		
	39-40	23(47.9)	25(52.1)	1		
BMI	18.5-24.9	67(66.3)	34(33.7)	0.467(0.252-0867)	0.914(0.345-2.416)	0.855
	>=25	35(47.9)	38(52.1)	1		
Abdominal wall status	Week/normal	101(65.6)	53(34.4)	0.028(0.004-0.212)	0.039(0.003-0.453)	0.010*
	Strong /tense	1(5.0)	19(95.0)	1		
Uterine tone	Lax	97(66.0)	50(34.0)	0.117(0.042-0.328)	0.622(0.121-3.206)	0.570
	Intense	5(18.5)	22(81.5)	1		
Head palpable	Palpable	99(62.7)	59(37.3)	0.138(0.038-0.503)	0.139(.024, 0.794)	0.026*
	Not palpable	3(18.8)	13(81.2)	1		
Fetal lie	Breech	91(57.2)	68(42.8)	2.055(0.627-6.733)	0.354(0.046-2.731)	0.319
	Transverse	11(73.3)	4(26.7)	1		
Fetal back	Front	9(40.9)	13(59.1)	3.130(1.206-8.122)	2.812(0.573-13.805)	0.203
	UK	9(81.8)	2(18.2)	0.368(0.098-2.366)		
	Right	19(41.3)	27(58.7)	3.079(1.485-6.383)		
	Left	65(68.4)	30(31.6)	1		
AFI	<=8cm	4(30.8)	9(69.2)	3.5(1.034-11.850)	0.872(0.139-5.462)	0.883
	8-25cm	98(60.9)	63(39.1)	1		
Placental location	Anterior	18(40.9)	26(59.1)	2.239(0.983-5.098)	6.94(1.404-34.318)	0.018*
	Posterior	53(67.1)	26(32.9)	0.760(0.366-1.581)		
	Fundal	31(60.8)	20(39.2)	1		
Forebag	<=1cm	25(34.7)	47(65.3)	5.790(2.985-11.232)	0.227(0.001-52.954)	0.594
	>1cm	77(75.5)	25(24.5)	1		
Engagement	Engaged	25(34.7)	47(65.3)	5.790(2.985-11.23)	31.733(0.126-7980.77)	0.220
	Not engaged	77(75.5)	25(24.5)	1		
Technique of ECV	Forward roll	58(80.6)	14(19.4)	0.138(0.067-0.286)	0.149(0.048-0.460)	0.001*
	Backward roll	12(85.7)	2(14.3)	0.095(0.020-0.453)		
	One after the other	32(36.4)	56(63.7)	1		

wall status, placental location, fetal head palpability and technique of external cephalic version were statistically significantly associated with outcome of external cephalic version procedure with p value <0.05. Accordingly, pregnant women with malpresentation who had lax or normal abdominal wall status were more likely to have successful external cephalic version [AOR (95% CI), 0.039(0.003-0.453)]. And those women whose fetal head were palpable during the external cephalic version procedure were more likely to have successful outcome [AOR (95% CI), 0.139(.024, 0.794)]. The likelihood of experiencing failed external cephalic version increased by more than seven-fold in women whose placentas were located anteriorly [AOR (95% CI), 6.94(1.404-34.318)]. During the procedure forward roll technique were more likely to effect in a successful outcome of external cephalic version [AOR (95% CI), 0.149(0.048-0.460)] (Table 7).

Discussion

Success rate of external cephalic version

This study was conducted to determine the Success rate and associated factors of External cephalic version among pregnant women with malpresentation after 36 weeks of gestation in University of Gondar specialized teaching hospital, North West Ethiopia, 2022. The success rate of ECV in our study was 58.6% and the results support our hypothesis that there is significant interaction between many of the variables assessed. Although thirteen factors were found to be significantly associated with the outcome of external cephalic version, only four remained as independent variables when examined by regression model. the variables that were significantly associated with success of ECV were lax abdominal wall status, posterior placenta, palpable fetal head and technique of ECV procedure. Caesarean deliveries in the last decade rise from approximately 23 to 34%, of which malpresentation is the third indication (approximately 17%), [3]. ECV is an important intervention that can contribute to put a hold on this. ECV is therefore widely advocated, but implementation of ECV varies, with an estimated 20–30% of eligible women not being offered ECV [5]. ECV is an obstetric procedure that involves applying pressure to a woman's abdomen with the goal to turn the fetus in either a forward or backward roll to achieve a vertex presentation near term. According to the updated ACOG practice guidelines for ECV and based on a recent meta-analysis, the success rate of this procedure ranged from 16% to 100%, with a pooled success rate of 58%[1]. Whereas RCOG recommends that about 50% of ECV attempts will be successful. Similarly, according to the SOGC guidelines, the procedure results in a cephalic presentation in approximately 60% of the time [29]. ECV, which is now routinely offered in developed countries, is not a popular procedure in the developing regions, such as Sub-Saharan Africa [7]. The reported probabilities of successful ECV procedures vary widely in the literature from 17–86%. Findings of our study were consistent with most of the researches done worldwide with the success rate of 58.6%, from 174 ECV cases analyzed, 102 cases were successful. This rate of ECV success is higher than reports from different studies across most parts of the world. In a study done in Washington, USA from 2003-2014 among 4981 women undergone ECV procedure, 57.2% of women had successful ECV [9], which is lower than our study. A prospective study done in Spain in 2010, which involves 500 ECV maneuvers, the success rate was 52.2% (261), [15], which is less than in our study. In another large retrospective cohort study of 18 years' experience done in UK in 2017 involving 2614 women, ECV was successful in 1280(49%)[12], which is smaller than the finding in our study, and comparable to a finding of 45.3% success rate from a retrospective cohort study of 287 cases of ECV in Israel [9]. Another retrospective cross-sectional study performed in Portugal from 2002-2018 where a total of 324 ECVs were performed and the overall success rate of the procedure was 33.3% which was much less than our study [31]. A study in 2013 from Saudi Arabia reported a low success rate of 53.9% among 128 ECV attempts [32]. In the most recent study in total Ireland, 604 women underwent an ECV and 54.5 % (329/604) had successful ECV and 45.5 % (275/604) had unsuccessful ECV which is still lower than our study(10). This success rate of ECV which is 58.6% in our study is also much lower than some other studies done in some parts of the world. Like a retrospective cohort study done in Germany in 2019 out of 547 EVC attempts, the success rate was 71.5%. Similarly, a prospective observational study done in China in 1997 involving 243 participants, the overall success rate was 69.5%. Another recent retrospective cohort study of prospectively collected data in Israel in 2019, from 602 women who underwent ECV procedure, ECV was successful in 432(71.7%). Similar recent prospective study done in India in 2018 involving only 52 women enrolled and the overall success rate of ECV were 61.5%. Coming to our continent Africa, a prospective observational study in 2004, there were 183 singleton breech presentations at term (3.5%). Of the 183, 111 of these women had an ECV and 74 (66.7%) of these were successful. Another recent cross-sectional study done in Ethiopia in 2018 with a total of 152 ECVs performed at St. Paul's Hospital Millennium Medical College, Addis Ababa, the success rate of ECV was 71.7%, which higher than our study. The lower ECV success rate in our study compared with the reports from the aforementioned studies around the world could be because of difference in methods of the study, different study populations with different body habitus, small number of participants with conflicting results in which Univariate analysis predominated but this does not exclude the possibility of confounding effect between the variables in a study period, use of tocolytics and analgesics during the procedure, more experienced operators, lie of the fetus.

Factors affecting ECV success

In the literature, a variety of factors have been mentioned as predictors of ECV success. In our study in the multivariate analysis, thin/lax abdominal wall status were significantly more likely to be associated with successful ECV as opposed to those who had strong/tense abdominal wall [AOR (95% CI), 0.039(0.003-0.453)]. This result was consistent with studies done in Hong Kong, China, Colombia, and Ethiopia. Moreover, women presenting with a palpable fetal head were significantly more likely to have successful ECV than those presenting with fetal head which not palpable during the procedure [AOR (95% CI), 0.139(.024, 0.794)]. And this result was supported by the studies done Hong kong, Portugal, china, Netherlands and Ethiopia [17, 15, 21, 12]. Furthermore, the likelihood of experiencing failed external cephalic version increased by more than seven-fold in women whose placentas were located anteriorly [AOR (95% CI), 6.94(1.404-34.318)]. And this result was also supported by

many studies done in UK, Spain, Saudi Arabia, Netherland, Israel, Nigeria and Ethiopia [11, 17, 6, 9, 12 , 14].

Conclusion

The success rate of ECV in this study is found to be 58.6%, Together with the prior literature, our findings reinforce that clinicians should consider offering an ECV procedure to improve the potential for vaginal birth of a cephalic infant, especially among women with prior pregnancies who have a high likelihood of a successful version. ECV procedures are considered low-risk with regards to maternal and foetal health. The success rate in our study which is almost comparable to most reports from previous studies. Thin/lax abdominal wall status, easily palpable fetal head and posterior placenta, were significantly associated with ECV success.

Strength and limitation of the study

Strength of the study

As patients were not selected on the basis of the success of the maneuver, the exposed population was close to the general population, the systematic offer of ECV to all patients without contraindications.

Limitation of the study

A limitation of this study was that we did not collect data about women's experiences with ECV or the setting in which it was performed. Further research on this topic is needed. Another limitation was that the size of the study population was not large enough to detect rare events, especially in a low-risk population. Lack of a standardized protocol for ECV.

Recommendation

In our study ECV at term reduces non-cephalic presentation by 58.5% and is considered a safe procedure to decrease cesarean delivery for malpresentation at term, thereby reiterating its routine implementation in pregnancies with non-cephalic presentations. It should be emphasized that all term patients with non-cephalic presentation, having no contraindications for ECV, should be offered and counseled about ECV. The art of performing ECV and acquiring skills in ECV should be considered mandatory in the postgraduate training of future obstetricians.

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