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Assessment of the Associated Factors, Management and Complications of Uterine Rupture at Mizan-Tepi University Teaching Hospital, Mizan-Aman Town, Bench-Maji Zone, Snnprs, South West Ethiopia, 2016/17: A Case Control Study

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Abstract

Background: Uterine rupture is tearing of the uterine wall during labor or delivery. Rupture of a previously unscarred uterus is usually a catastrophic event resulting in death of the baby, extensive damage to the uterus and sometimes even maternal death from blood loss.

The overall incidence of uterine rupture is 1 in 2,000 deliveries. In developing countries, uterine rupture is more prevalent and is a serious problem.

Objective: To Assess the associated factors, management and complications of uterine rupture in Mizan-Tepi University Teaching hospital, Mizan-Aman town, Bench-Maji Zone, SNNPRS, South west Ethiopia, 2016/17.

Methodology: A Hospital based unmatched multi-factorial case-control study was employed from 1st October - 30th October 2016. The required sample size gave us a total of 352 Delivery Charts by considering case to control ratio of 1:4, of these 71 were Delivery Charts with Uterine Rupture and 281 were Delivery Charts without uterine Rupture were selected by using lottery method. Data was retrieved using pre-tested and structured data extraction format from operation notes, delivery registers and patients cards documented from 2013-2015 G.C. Using SPSS version 20 software, descriptive statistics ,bivariate and multivariate logistic regression analysis was done and p-value <0.2 and <0.05 were considered as significant during bivariate and Multivariate logistic regression analysis Respectively. AOR with 95% CI was used to control for possible confounders and to interpret the result.

Result: From 1st January 2013 up to 31st December 2015 there were a total of 9878 Deliveries from these 71 Cases of uterine rupture were recorded giving an incidence of 1

in 139 Deliveries. Predisposing factors for uterine rupture were No antenatal care (AOR 4.08 95% CI 1.924-8.651), Labor Duration >18 hrs (OR 2.769 95% CI 1.231-6.226), parity ≥ 5 (AOR 6.16 95% CI 2.886-13.148), Having Obstructed Labor (AOR 2.714 95% CI 1.228-5.720), No use of Partograph (AOR 2.248, 95% CI 1.049-4.817). There were 7 maternal deaths due to uterine rupture during the study period giving a mortality rate of ~0.07%.

Conclusion: Uterine rupture still remains one of the major causes of maternal and newborn morbidity and mortality. The prenatal mortality for both case and controls is high in Mizan-Tepi University Teaching Hospital.

Keywords: Uterine rupture; Associated factors; Management; Complications

Introduction

Uterine rupture is tearing of the uterine wall during labor or delivery. The overall incidence of uterine rupture is 1 in 2,000 deliveries. The key factor in the cause of rupture is whether or not the uterus is scarred. Rupture of an unscarred uterus is rare, estimated to occur 1 in 5700 to 20,000 pregnancies. Rupture of a previously unscarred uterus is usually a catastrophic event resulting in death of the baby, extensive damage to the uterus and sometimes even maternal death from blood loss [1,2].

The uterine scar separations can take different forms which include a spectrum of problems ranging from asymptomatic scar dehiscence to overt uterine rupture, a large rupture may be associated with massive haemorrhage with complete fetal extrusion from the uterus into the peritoneal cavity whereas small rupture may have minimal bleeding and insignificant maternal and fetal consequences. The most common predisposing factors for uterine rupture include grand multiparity and obstetric trauma resulting from prolonged or

neglected labor, fetal macrosomia, internal podalic version, breech extraction and instrumental deliveries [3-6].

Rupture of an unscarred uterus is usually traumatic, and its incidence decreases with improvement in obstetric practice. Rupture of the scarred uterus is more common and usually occurs after a trial of labor in a patient with a previous Caesarean section. According to literatures, of the eight emergency obstetric care indicators these are Availability of emergency obstetric care (EmOC) services, geographical distribution of EmOC facilities, Proportion of all births in EmOC facilities, meet need for EmOC, Caesarean sections as a proportion of all births, direct obstetric case fatality rate, intra-partum and very early neonatal death rate and Proportion of deaths due to indirect causes in EmOC facilities of these the case fatality rate of any obstetric case in emergency obstetric facilities is the one which should not be greater than 1% [7-12].

According to Ethiopian Demographic and Health survey (EDHS) 2011 report, the maternal mortality is 541/100,000 live births and perinatal mortality is 88/1000 live birth in this report uterine rupture in combination with obstructed labor is one of the leading causes of maternal mortality in Ethiopia from 2000 to 2012, accounting for thirty six percent (36%) of maternal deaths [13]. Previously the most common predisposing factors for uterine rupture includes grand multiparty prolonged or neglected labor, fetal macrosomia, internal podalic version, breech extraction and instrumental deliveries. Today with the introduction of modern obstetrics fetal macrosomia and mal-presentation are detected more reliably with ultrasound and prolonged labour and difficult vaginal deliveries have been replaced largely by caesarean delivery. As a result, obstetric risk factors are becoming less and rupture of unscarred uterus has become relatively rare in the developed world [2,14,15].

A three month retrospective study done in Mizan-Tepi University Teaching hospital in 2014 has revealed that out of 384 deliveries attended the maternal mortality and C/S rate was 3.39% and 15.89% respectively. Uterine rupture stands 3rd from the cause of mortality and accounts 1.5% as an indication for C/S, in 2005 Ethiopian fiscal year of South Nations Nationalities and peoples region, the regional institutional maternal death has increased from 0.06% in 2005 to 0.07% in 2006 EFY.

The maternal death is widely varied from facility to facility and it was higher than the limit in two hospitals in the region and Mizan-Tepi university Teaching hospital is, as located in, not spare either where the mortality rate is 0.28%, for this death, five major obstetric complications were identified to be the major causes: haemorrhage (postpartum, ante-partum), ruptured uterus, eclampsia, obstructed labor, and infection. Uterine rupture stands the second important cause, and probably it might be involved in other obstetric deaths as it can attribute for other cases such as haemorrhage [16,17].

Even though, determining the associated factors, management and complications of uterine rupture is invaluable step to decrease the maternal and neonatal

morbidity and mortality from uterine rupture but most of the studies conducted in this region had assessed the cause of maternal mortality and morbidity but failed to assess the factors associated with uterine rupture, generally with ready access to obstetric care including caesarean delivery for obstructed labor, rupture of the uterus should be rare. Such high rate of uterine rupture for unknown reason in this hospital shows the need for further study specifically in Mizan-Tepi University Teaching Hospital because factors such as higher flow of complicated labor, neighbouring referrals, infrastructure and other factors may create differences in the occurrence of the Cases. So that this study was intended to assess the associated factors, management and complications of uterine rupture in Mizan-Tepi University Teaching Hospital, Bench-Maji Zone, SNNPRS, South West Ethiopia.

Methods and Materials

Study design

A Hospital Based Unmatched multi-factorial case control study was employed.

Study area and period

Mizan-Teferi with the neighbouring town of Aman forms a separate town called Mizan-Aman surrounded by Dehub Bench Woreda. Mizan-Aman town is the largest town and administrative centre for Bench-Maji Zone. Mizan-Aman town has total population of 34,080; of which 18,138 are males and 15,942 are Females. This town has latitude and longitude of 70°N 3535' E/ 7.000N 35.583E and an elevation of 1451 m above sea level. The town has one Teaching Hospital and also the location of two institution of Higher education, namely Aman Health science Collage and Mizan-Tepi University. The Teaching Hospital was located in Aman town and established in 1986. It is the only Teaching hospital in the Bench-Maji zone that gives charge free service for pregnant mothers and neonates. It has total of 136 beds and it runs multidisciplinary health care system with total of 209 staffs, of these 155 are health professionals (2 specialists, 12 Medical doctors, 75 Nurses, 15 Midwives, 25 Laboratory professionals, 16 Physiotherapists, 2 Environmental Health Officers, 2 Ophthalmologists, 3 X-ray Technicians, 1 Health Officers and 2 Dentists) and the remaining 54 are supportive staffs [18]. So this study was conducted in Mizan-Tepi University Teaching Hospital from 1st October-30th October 2016.

Definition and selection of cases and controls

Cases

Uterine rupture: It is defined as incomplete or complete rupture of the uterus caused by obstetric manipulation, use of utero tonic drugs or spontaneously without any iatrogenic manipulation not including traumatic ruptures of uterus. All delivery charts registered at Mizan-Tepi University Teaching Hospital during the three Year and diagnosed as uterine rupture before, during or after admission or intra-operatively.

Controls

All delivery charts with normal and abnormal labor and delivery registered at Mizan-Tepi University Teaching Hospital during the three Years and did not have diagnosis of uterine rupture.

Sample size determination

Residence (rural), Parity (>2), having <4 ANC visit, and Maternal Age (30-39), were considered in order to calculate required sample size by revising different literatures. To calculate sample size all the above exposure variables are considered and Maternal Age (30-39) was chosen as an independent variable since it gives maximum sample size as compared to other exposure variables. Then the required sample size of the study participants was determined by using formula for two population proportion and calculated by statistical Epi-info version 7.1.1 software package by considering that proportion of Maternal Age (30-39) from control so the percent of controls exposed among controls was 34.4% with 2.2 odds ratio taken from similar study done in Nigeria [19]. 95% confidence level, 80% power of the study and case to control ratio of 1:4 was used (for every cases 4 controls was selected).

$$\eta_1 = \left[z\alpha/2\sqrt{\left(1 + \frac{1}{r}\right)p(1-p)} + z\beta\sqrt{p_1(1-p_1) + \frac{p_2^2(1-p_2^2)}{r}} \right] 2/(p_1 - p_2)^2$$

Finally the calculated sample size gave us total of 352 out of this 71 were from case and 281 were from controls.

Basic assumptions: n_1 = Final sample size =352, Z=standard normal variant for level of significance=1.96, R=ratio of control subjects per case subjects=4, Power of the study = 80%, Odds ratio=2.2, Percent of controls exposed among controls =34.4%, Percent of cases exposed among cases=53.6%, Confidence level=95%.

Data collection tool and procedure

A three year data from 1st January 2013 to 31st December 2015 were collected using pretested and structured data extraction format which was prepared in English. To address the objectives of this study the content of the data extraction format was adopted from demographic health Surveys, WHO questionnaires and other literatures [20-26]. The data collectors and supervisors were 8 BSc. and 2 MSc. Health professionals respectively. Secondary data were collected primarily by reviewing delivery registration books, maternal delivery charts and operation books.

Data quality control

Data quality was ensured during collection, coding, entry and analysis. To increase the quality of data during data collection three teams namely data collectors, supervisors and investigators were assigned and properly designed, semi-structured and pretested data extraction format were used. Training was given to the data collectors and supervisors to

prevent any confusion and have a common understanding about the tool. Each card was checked for its consistency, provision of full information and appropriate documentation. Supervision of data collectors were done by supervisors and include observation of how the data collectors were collecting data. The data collectors were instructed to write card number on the data extraction format during the data collection so that any identified errors were traced back and checked using the card number. The filled data extraction formats were checked by data collectors, supervisors and Principal investigators for completeness and clarity on a daily basis.

Data processing and analysis

After the returned data extraction format were checked for completeness and clarity, it was cleaned manually, coded and entered in to SPSS version 20 statistical package to be cleaned, edited and analyzed by the principal investigators for further analysis. Frequencies and Percentage was used to summarize descriptive statistics, tables and charts were used for data presentation. Logistic regression model was used and bivariate logistic regression was done to determine association between each independent variable with dependent variable. Variables with P- value < 0.2 in bivariate analysis were entered in to next multivariate analysis and multiple logistic regression analysis was done to determine relative prediction level of independent variables to the outcome variable. Variables having p-value <0.05 were considered as statistically significant and Adjusted Odds Ratio (AOR) with 95% CI was used to control for possible confounders and to interpret the result.

Ethical consideration

After approval of the document by Mizan-Tepi University college of health sciences then the study institution was communicated through formal letter written from the department of Midwifery and Permissions were obtained from the study health institution to proceed with the study.

The confidentiality of the institution was preserved well, there was no personal identifier attached during data retrieval. There was no intention to collect any additional information from the institution and there were no risks that follow with participation in this research. During the study the institution had full right to withhold information, skip questions or to withdraw from the study at any time and there would be no effect at all in the benefit or other administrative effect that the institution would get from their refusal to participate. Nobody was needed to explain the reason for withdrawal.

Result

Socio-demographic characteristics

The age of the mothers ranged from 20 to 39 years old for both cases and controls, and the mean Age with standard deviation of 30.38+4.8 vs. 27.2+5.8 and majority 25 (35.21%) of cases were in the age of 35-39 years old and Majority 125 (44.4%) of controls were in the range of 20-24 years old. The

highest Number of Mothers for both cases and controls were from urban area accounting 38 (53.5%) vs. 176 (62.6%) respectively. Out of the total participant 55 (77.5%) of cases and 179 (63.7%) of Controls were admitted with referral (**Table 1**).

Table 1 Distribution of cases and controls by their socio-demographic factors in Mizan-Tepi University Teaching Hospital, SNNPRS, South West, Ethiopia 2016/17.

Variables	Cases (n= 71)	Controls (n=281)	Total (N=352)
Year of Admission			
2013 GC	40 (56.3%)	34 (12.1%)	74 (21.02%)
2014GC	17 (23.9%)	131 (46.6%)	148 (42.05%)
2015GC	14 (19.7%)	116 (41.3%)	130 (36.93%)
Residence			
Urban	38 (53.5%)	176 (62.6%)	214 (60.8%)
Rural	33 (46.5%)	105 (37.4%)	138 (39.2%)
Admission status			
Referred	55 (77.5%)	179 (63.7%)	234 (66.48%)
Non referred	16 (22.5%)	102 (36.3%)	118 (33.52%)
Age in years			
20- 24	8 (11.27%)	125 (44.5%)	133 (37.7%)
25- 29	19 (26.76%)	46 (16.3%)	65 (18.46%)
30-34	19(26.76%)	82(29.2%)	101(28.69%)
35-39	25(35.21%)	28(10%)	53(15.05%)

Part II - Obstetric factors

Out of 71 Cases Majority 44 (61.97%) were Primi para and only 27 (38.03%) of cases were Multi parous in contrast to this from 281 Controls Majority 177 (62.99%) were Multi-parous and 104 (37.01%) were Primiparous.

From the overall sample, 220 (62.5%) had ANC visit {13 (5.91%) for Cases vs. 207 (94.09%) for Controls} had ANC follow-up, out of cases and Controls who had ANC follow up 19 (8.64%) were Diagnosed Having obstetrics Complications, {13 (23.9%) of cases vs. 6 (2.1%) of Controls} were diagnosed having obstetric complications of these who were diagnosed with obstetric complication during ANC follow-up 12 (63.16%); {8(66.67%) of cases vs. 4 (33.33%) Controls} Had Hypertensive Disorders of Pregnancy, and 7 (36.84%); {5 (71.43%) for Cases vs. 2 (28.57%) for Controls} had Ante-Partum Hemorrhage (APH), and the rest 132 (37.5%) {58 (43.94%) of cases vs. 74 (56.06%) of Controls} had no ANC follow-up.

From the total of 352 study participants Majority 231 (65.63%); {56 (78.8%) Cases vs.175 (62.3%) controls} had no previous Caesarean Section, among 121 (34.37%) who Had caesarean section at least one and more than one 15 (21.1%) vs. 106 (37.7%) were among Cases and controls respectively,

out of these who had Previous Caesarean Section 114(94.2%); {13(86.67%) cases vs. 101(95.28%) controls} Had Lower Uterine segment Transverse Caesarean Section (LUSTC/S), 4 (3.31%); {1 (6.67%) cases vs. 3 (2.83%) controls} Had Classical Caesarean Section and 3 (2.48%); {1 (6.67%) for Cases vs. 2 (1.89%) of Controls} had Inverted "T" caesarean Section. From 352 total Participants 23 (6.53%) had Uterine operation other than C/S these {23 (6.53%)} uterine operation were among cases only (**Table 2**).

Table 2 Distribution of cases and controls by their obstetric factors in Mizan-Tepi University Teaching Hospital, SNNPRS, South West, Ethiopia 2016/17.

Variables		Cases (n=71)	Controls (n=281)	Total (N=352)
Parity	Primi	44 (62%)	104 (37.0%)	148 (42.04%)
	Multi	27 (38%)	177 (63%)	204 (57.96%)
ANC follow-up	Yes	13 (18.3%)	207 (73.7%)	220 (62.5%)
	No	58 (81.69%)	74 (26.3%)	132 (37.5%)
Obstetric Complication	Yes	17 (23.9%)	6 (2.1%)	23 (6.53%)
	No	54 (76.1%)	275 (97.9%)	329 (93.47%)
Type of Complication	HDP	8 (66.67%)	4 (33.33%)	12 (63.16%)
	APH	2 (28.57%)	5 (71.43%)	7 (36.84%)
Previous C/S	Yes	15 (21.1%)	106 (37.7%)	121 (34.38%)
	No	56 (78.9%)	175 (62.3%)	231 (65.62%)
Type of C/S	LUSTC/S	13 (86.67%)	101 (95.28%)	114 (94.2%)
	Inverted "T"	1 (6.67%)	2 (1.89%)	3 (2.48%)
	Classical	1 (6.67%)	3 (2.83%)	4 (3.31%)
Uterine Operation Other than C/S	Yes	23 (32.4%)	0 (0%)	23 (6.53%)
	No	48 (67.6%)	281 (100%)	329 (93.47%)

Part III: Labor and delivery factors

From a total of 71 cases majority 64 (90.14%) of women were at term pregnancy when compared to Controls which is 234 (83.27%).

From the 352 Participants the majority 223 (63.35%) of the Mothers have Singleton Intrauterine Pregnancy {52 (73.24%) cases vs. 171 (60.85%) controls} and 129 (36.65%) had Twin intrauterine Pregnancy {19 (26.8%) cases vs. 110 (39.1%) controls}. From the total 352 participants 150 (42.6%) had Mal

presentation {30 (42.25%) cases vs. 120 (42.7%)}. Regarding the onset of labor Majority 132 (37.5%) were spontaneous {43 (60.6%) from cases and 89 (31.7%) from controls}.

From the total of 71 Cases, 11 (15.5%) the rupture occurs in the Hospital while the rest 60 (84.5%) occurs outside the hospital (**Table 3**).

Table 3 Distribution of cases and controls by their labor and delivery factors in Mizan-Tepi University Teaching Hospital, SNNPRS, South West, Ethiopia 2016/17.

Variables	Cases (n=71)	Control (n=281)	Total (N=352)
Gestational Age			
Pre term	4 (5.6%)	15 (5.3%)	19 (5.4%)
Term	64 (90.1%)	234 (83.3%)	298 (84.66%)
Post Term	3 (4.2%)	32 (11.4%)	35 (9.94%)
Status of Pregnancy			
Singleton	52 (73.2%)	171 (60.9%)	223 (63.35%)
Twin	19 (26.8%)	110 (39.1%)	129 (36.65%)
Presentation			
Normal	41 (57.7%)	161 (57.3%)	202 (57.89%)
Abnormal	30 (42.3%)	120 (42.7%)	150 (42.61%)
Onset of Labor			
Spontaneous	43 (60.6%)	89 (31.7%)	132 (37.5%)
Induced	28 (39.4%)	192 (68.3%)	220 (62.5%)
Duration of Labor			
<18 hr	21 (29.6%)	75 (26.69%)	96 (27.3%)
>18 hr	50 (70.4%)	206 (73.31%)	256 (72.7%)
Augmentation			
Yes	50 (70.4%)	264 (93.95%)	314 (89.2%)
No	21 (29.6%)	17 (6.05%)	38 (10.8%)
Partograph used			
Yes	36 (50.7%)	62 (22.1%)	98 (27.84%)
No	35 (49.3%)	219 (77.9%)	254 (72.16%)
Obstructed labor			
Yes	16 (22.53%)	90 (32.03%)	106 (30.11%)
No	55 (77.46%)	191 (67.97%)	246 (69.89%)
Birth weigh			
<2500 gm	1 (1.41%)	3 (1.07%)	4 (1.14%)
2500-4000 gm	42 (59.15%)	247 (87.90%)	289 (82.10%)

>4000 gm	28 (39.44%)	31 (11.03%)	59 (16.76%)
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Part-IV Management of uterine rupture

From the total sample of 352 most 297 (84.38%) didn't receive blood transfusion and 55 (15.62%) of the mothers receive blood transfusion from these 28 (39.44%) of cases receive blood transfusion and 43 (60.56%) didn't receive blood transfusion when we compared to controls which is 27 (9.61%) Receive and 254 (90.39%) didn't receive. Likewise from those cases the rupture were managed with Repaired and BTL in 34 (47.88%), with Repaired only in 28 (39.44%) and subtotal Hysterectomy in 9 (12.68%) (**Table 4**).

Part-V Complications of uterine rupture

From the total of 71 cases most 64 (90.14%) of the maternal condition and 26 (36.6%) of the fetal condition were stable when compared to controls which is 100% of the maternal and 272 (96.8%) of the fetal condition were stable.

Table 4 Showing the complications of uterine rupture in Mizan-Tepi University Teaching Hospital, SNNPRS, South West Ethiopia, 2016/17.

Variables	Cases (n=71)	Control (n=281)	Total (N=352)
Maternal Condition			
Stable	64 (90.1%)	281 (100%)	345 (98.01%)
Died	7 (9.9%)	0 (0%)	7 (1.99%)
Fetal condition			
Alive	26 (36.6%)	272 (96.8%)	298 (84.65%)
Still Birth	45 (63.4%)	9 (3.2%)	54 (15.34%)
1st Minute APGAR			
<3	45 (63.38%)	9 (3.2%)	54 (15.34%)
04-Jun	0 (0%)	53 (18.86%)	53 (15.06%)
>7	26 (36.62%)	219 (77.94%)	245 (69.60%)
Hospitalization			
<8 days	21 (29.58%)	281 (100%)	302 (85.8%)
>9 says	50 (70.42%)	0 (0%)	50 (14.2%)
Any organ failure			
Yes	4 (5.6%)	0 (0%)	4 (1.14%)
No	67 (94.4%)	281 (100%)	348 (98.86%)
Any intervention			
Managed	3 (4.22%)	0 (0%)	3 (4.22%)
Referred	1 (1.41%)	0 (0%)	1 (1.41%)

Factors associated with uterine rupture

Residence of the Mother, Admission Type of the Mother, Parity, ANC follow up, Duration of Labor, Obstructed Labor, and Proper use of Partograph are found to have significant

association with uterine rupture in Bivariate Analysis with cut point of P-Value <0.2.

In Multivariate analysis After controlling the effect of other variables out of seven Variables which showed to have Significant association in Bivariety analysis Five variables were found to have statistically significant association with uterine rupture these are; Parity, ANC follow-up, Duration of Labor, Obstructed Labor and Proper use of Partograph.

When Adjusted for Primi Paras the odds of occurring uterine rupture in Multiparas is 6.16 times higher when compared with Primi Paras {AOR 6.16, 95% CI (2.886-13.148)}. Similarly the odds of Uterine Rupture occurrence is 4.08 times higher

among those who have no ANC follow up than who have ANC follow-up in their current Pregnancy {AOR 4.08, 95% CI (1.924-8.651)}. Likewise the Odds of Uterine Rupture is 2.77 times higher among those mothers whose labor stayed more than 18 hours than those who have labor duration of less than 18 hours {AOR 2.77, 95% CI (1.231-6.226)}. The Odds of Uterine rupture is 2.71times Higher in those mothers who has Obstructed Labor than those who didn't had {AOR 2.71, 95% CI (1.288-5.720)} likewise the odds of Uterine rupture is almost 2.25 times higher in those mothers whose labor wasn't followed by partograph than those followed by partograph properly {AOR 2.248, 95% CI (1.049-4.817)} (**Table 5**).

Table 5 Factors associated with uterine rupture at Mizan-Tepi University Teaching Hospital SNNPRS, South West, Ethiopia 2016/17.

Factors	Categories	Cases (n=71)	Controls (n=281)	COR, 95% CI	P-Value	AOR , 95%CI
Parity	Primi (R)	44	104	1	1	1
	Multi	27	177	2.77 (1.621-4.744)	0	6.160 (2.886-13.148)*
Duration of Labor	Normal (R)	21	75	1	1	1
	Prolonged	50	206	4.22 (2.447-7.270)	0.014	2.769 (1.231-6.226)*
ANC follow-up	Yes (R)	13	207	1	1	1
	No	58	74	1.82 (1.056-3.141)	0	4.080 (1.924-8.651) *
Residence	Urban (R)	38	176	1	1	1
	Rural	33	105	0.69 (0.406-1.162)	0.18	1.60 (0.804-3.194)
Obstructed Labor	No (R)	55	191	1	1	1
	Yes	16	90	1.62 (0.880-2.983)	0.009	2.71 (1.288-5.720)*
Admission Type	Not Referred (R)	16	102	1	1	1
	Referred	55	179	0.51 (0.278-0.937)	0.957	1.023 (0.456-2.295)
Use of Partograph	Yes (R)	36	62	1	1	1
	No	35	219	3.633 (2.109-6.26)	0.037	2.248 (1.049-4.817)*

*are significant variables, R: reference categories

Discussion

Fifty Five (77.46%) women in the case group were admitted with referral, of these only 7 (12.73%) were referred with diagnosis of uterine rupture. This is striking point because among the 55 cases, 48 (87.27%) mothers with uterine rupture were either misdiagnosed at the referring institution or developed rupture on the way to this hospital. Gap in misdiagnosis in turn might worsen the complications as there will be delay in appropriate management or care provision. The three delays were also hidden problems in Adigrat hospital [9].

Multi-parity is significantly associated with uterine rupture in this study. According to different literatures This may be due to As the number of pregnancy increased /as the Parity of the

mother increased the uterus will thinned out which makes them prone to rupture and also, when mechanical obstruction occurs, uterine contractions gradually become weaker and stop in primigravidas, but in multi-parious women, the contractions often continue till delivery and end up with uterine rupture.

A number of studies put unbooked ANC/No ANC follow up statistically significantly associated with uterine rupture. In this study, over 81.69% of the cases have no antenatal care and were 2.1 times more likely to have uterine rupture and because Ante Natal Care Visit is a contact time for identifying problems such as mal-presentation and time to advise on sign of labor and timely arrival of laboring women to health facilities if they Miss these they most likely deliver at home with no birth preparedness and Complication Readiness

compared to those who attended ANC regularly, On the other hand, majority of women who had no ANC follow up in this particular study are also in the group of multiparous women, so these coupled factors may have contributed to the rupture of uterus such results have been reported in other studies done in Adigrat Hospital Ethiopia, Ilorin Nigeria, Mbarara Western Uganda and North Central Nigeria [9,20,21,27].

In this study prolonged labor and Obstructed Labor were statistically significantly associated with uterine rupture. In high income countries, the majority of uterine rupture occurs in women with previous caesarean section, while in low income countries, it usually results from prolonged labor often in unscarred uterus additionally, due to the difference in uterine muscle strength most of Primi paras who have developed prolonged labor or obstructed labor ends up with developing fistula and in Multiparas it will end up with Rupture However, most cases are usually associated with a combination of risk factors including multiparty, Having Obstructed Labor and or Prolonged Labor. This finding is also consistent with the study done in Rural Ethiopia, Debreworkos Hospital Ethiopia, Rural Uganda, South west Nigeria and Ilorin Nigeria [8,20,23,25].

Proper Utilization of the partograph is a useful tool for monitoring progress of labor and makes the health professional to be alert when the labor deviates from Normal to abnormal, which makes the professional to intervene the labor accordingly preventing obstructed labor and thereby improving maternal and fetal outcome. However, its proper utilization still remains as a challenge in this and most facilities this may be probably due to lack of skills, Health Professionals attitudes and/or lack of papers [28,29]. Not using a partograph is 19 times more likely to result in uterine rupture.

Though previous caesarean section scar dehiscence was the third common cause of uterine rupture but not significant in this study, this may be due to the fact that such risky women are closely followed and advised during ANC follow up, closely monitored during labor with special monitoring chart and also could have timely intervention. Though it was not significant which was also supported by the study conducted in North Central Nigeria [27].

Management of uterine rupture usually vary from place to place depending on general condition of the patient, age, parity, and cultural background, extent of rupture, available facilities, surgeons experience, presence of infection and others [30]. In this study Repair of tear was commonest type of operation 62 (87.32%) {34 (47.9%) with BTL and 28 (39.4) without BTL}. Supporting this finding, a study conducted in Turkey showed that, and repair of ruptured uterus 58 (95.1%) was the most common type [31]. In contrast to this studies conducted in different African countries like Uganda and Nigeria showed that majority of ruptured uterus are managed with Total Abdominal Hysterectomy and Sub-total Abdominal Hysterectomy [20,21]. Moreover, TAH (77.1%) was the most common type of operation and repair done in 13 (24%) of cases in Debreworkos, Ethiopia [32]. In the same study done in rural part of Ethiopia repair of uterus contributed 5 (38.4%) of maternal death [23]. It was contrary to the finding showed in

this study, despite majority of operation were repair, no death was recorded with the management. Since Total Abdominal Hysterectomy and Subtotal Abdominal Hysterectomy are relatively longer procedure and depletes blood volume because of greater estimated blood loss it is better to repair uterine rupture with Bilateral Tubal Ligation (BTL) since it is safer procedure because most of the mothers in this area their base line Haemoglobin status is unknown.

The perinatal mortality in both case and controls {45 (63.4%) vs 9 (3.2%)} were higher when compared to a study conducted in Israel (19.0% vs1.4%) [19]. Perinatal mortality in other cross sectional studies conducted in Ethiopia, Ghana and India also reported higher rate which goes in hand with the finding in this study [9,23,24,28,34]. Such discrepancy in outcome of the newborn in developed and developing countries mainly depend on amount of blood loss. It is difficult to save the newborn when there is excessive blood loss during complete uterine rupture which is the case for most developing countries [35-38].

Strength and limitation of the study

Strength

- It incorporates extended period of time to have adequate samples.
- As uterine rupture rare, case control design best explains the associated factor.
- Limitation
- Some cards lack information because of incompleteness and poor record keeping among cases and controls.
- Using secondary data limits access to some important information taken from the mother that may have a significant association with uterine rupture.

Conclusion

- Majority of uterine ruptures happened before hospital admission and cases came from rural communities. There were some cases of uterine ruptures due to certain inappropriate obstetric procedures in this hospital.
- Prolonged or obstructed labor, mal presentation, ANC follow-up, grand multi-parity and labor duration greater than 18 hours were found to have statistically significantly associated with uterine rupture in this study.
- Uterine rupture is more common among women who had prolonged labor when compared to normal labor.
- Having antenatal care follow up has significant effect in prevention of uterine rupture
- Women who have had obstructed labor are at higher risk of uterine rupture when compared to normal labor.
- Proper use of partograph will significantly decrease the risk of uterine rupture.
- The prenatal mortality for both case and controls is high.
- Repair of tear with Bilateral Tubal Ligation was the most common type of operation.

Recommendations

Based on the findings of the study the following recommendations will be forwarded to the concerned bodies.

To bench-maji zone health berue

- Availability of transportation (Ambulance) between each facility at all level should be secured to facilitate timely referral so that delays can be prevented.
- Health providers who are found at primary health care unit should be aware of any obstetric complication before its occurrence or early complication detection.
- Maternity care providers should be trained and/or updated on proper partograph utilization and complication readiness to enhance quality of care.
- Proper partograph utilization should be encouraged at all health facility level
- Community mobilization should be done in collaboration with concerned stakeholders to increase awareness of mothers that help them to limit number of children and seek health service early.

To Mizan-Tepi university teaching hospital chief clinical director

- Update the knowledge of the staffs through in-site or of site training
- Health providers should properly deliver health education on advantage of having antenatal care in prevention of obstetric complication.

To Mizan-Tepi university teaching hospital maternity ward head

- Partograph paper should be duplicated and attached to every delivery charts
- Proper utilization of the partograph should be monitored on daily bases for every delivery
- Avail Up-to-date labor management guidelines on the ward

To Mizan-Tepi university teaching hospital maternity ward staffs

- The delays should be tackled at each level to prevent prolonged labor
- Should strictly follow progress of labor using standard tool to detect labor abnormality earlier.

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