



ST.PAUL HOSPITAL MILLENIUM MEDICAL COLLEGE

Magnitude of uterine rupture and associated factors among mothers delivered at St.paul Hospital Millennium Medical College and Yekatit 12 hospital from September, 2015 to August 2017.

Two year retrospective study

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A Research to be submitted to St. Paul Hospital Millennium Medical College department of Obstetrics and Gynecology in partial fulfillment of the requirements for the degree of specialty certificate in Obstetrics and Gynecology.

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Addis Abeba, Ethiopia

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LIST OF ABBREVIATIONS:

ANC-Antenatal care

BTL-Bilateral Tubal Ligation

CPD-Cephalopelvic disproportion

DVT-Deep Vein Thrombosis

DIC-Disseminated Intravascular Coagulation

GA-Gestational Age

HC-Health Center

HIV-Human immune deficiency virus

ICU-Intensive Care Unit

Km-Kilo meter

LUS-Low uterine segment

MOF-Multiple organ failure

OBGYN-Obstetrics and Gynecology

RVF-Recto vaginal fistula

SVD-Spontaneous Vaginal Delivery

SPHMMC-St. Paul's Hospital Millennium Medical College

SAH-Subtotal Hysterectomy

TAH-Total Abdominal Hysterectomy

VVF-Vesico vaginal fistula

Wks.-Weeks

WHO-World Health Organization

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Abstract:

Background: Uterine rupture is still one of the major public health problem in developing countries especially sub-Saharan Africa endangering the life of many mothers and also can lead to multiple adverse maternal and fetal outcome including severe hemorrhage, bladder injury, hysterectomy and even death. With obstructed labor, currently becomes one of the leading cause of maternal mortality in Ethiopia. St.paul Hospital Millennium Medical College and Yekatit 12 Hospital Medical College are among the tertiary hospitals in the country with high delivery rate.

Objective: - To assess the magnitude of uterine rupture and associated factors among mothers presented to St.paul Hospital Millennium Medical College and Yekatit 12 Hospital Medical College from September 2015 to August 2017 G.C

Methods: Both descriptive and analytical hospital based cross-sectional study was conducted to assess magnitude, associated factors and factors associated with maternal death among mothers with uterine rupture during the study period. Data was cleaned, coded and analyzed by using SPSS version 21.

Result: A total of 63 cases of uterine rupture out of 28,241 total number of deliveries, making magnitude of uterine rupture 1 in 448.3 deliveries (0.22%). Among mothers with uterine rupture, there were 4 maternal death (3 post-partum, 1 intra-partum) making case fatality rate of 7%. Among mothers with uterine rupture, 43.9% of them had obstructed labor.

Conclusion:

The magnitude of uterine rupture in the study area was low as compared to the previous study done in Ethiopia. Most of mothers with uterine rupture had cephalopelvic disproportion/obstructed labor.

Recommendation:

-Health professionals at health centers needs to be updated on identification and early referral of pregnant mothers who have risk factors for uterine rupture to appropriate hospital during antepartum period because most of mothers with uterine rupture had antenatal care follow up at health center and referred after uterine rupture

-I also recommend further research with larger sample size.

INTRODUCTION

1.1. Background:

Uterine rupture is the non-surgical disruption of uterine layers including endometrium, myometrium and serosa during pregnancy, labor or delivery. This uterine rupture can be primary (occurring in previously intact uterus) or secondary (occurring in scarred uterus or anomalous uterus). Uterine rupture can also be complete (when all layers of uterine wall involved) or incomplete (when serosa remain intact). It is the catastrophic event in obstetrics, often resulting in both maternal and fetal adverse consequences (1). Currently, prevalence of uterine rupture becomes rare in industrialized countries due to good obstetric practice and availability of healthy institution with skilled health professionals and also due to decrement in instrumental deliveries (particularly decrease in use of forceps), but still it is one of the major cause of maternal morbidity and mortality in resource poor nations and with its grave fetal outcome. The incidence of uterine rupture in developed countries was cited as 1 in 4800 deliveries (1). According to a research done in one rural tertiary hospital in northwest Nigeria, the prevalence of uterine rupture in that hospital was 1 in 68 deliveries (1.5%) and the major cause of uterine rupture in this hospital were prolonged/obstructed labor, previous cesarean delivery and injudicious use of oxytocin (2).

Risk factors for uterine ruptures are obstructed labor, injudicious obstetric interventions/manipulations, uterine scar, uterine anomaly, lack of ANC, grand multiparty, poor access to emergency obstetric care, poor socio-economic status, increasing maternal age and unwise use of Uterotonics (3). Uterine rupture has multiple adverse maternal and fetal consequences with the outcome depends on type, size and location of rupture and speed of intervention.

1.2. Statement of the problem:

Even though it is a rare events in developed countries, uterine rupture is still one of the major public health problem in developing countries especially sub-Saharan Africa with multiple adverse maternal and fetal consequences **(1)**. According to WHO systematic review of maternal mortality and morbidity, in developed countries the prevalence of uterine rupture in women with previous cesarean section was in the region of 1%, whereas for women without previous cesarean scar it is extremely rare(<1 in 10,000). The overall rates are below 1 in 1000 and the prevalence rates in developing countries are in the range of 0.1% to 1 % **(4)**. According to my literature review, the prevalence of uterine rupture in Ethiopia was in the range of 0.9% to 2.24% (average ~1.6%) **(5-7, 16)**.

In industrialized nations, uterine rupture is commonly associated with use of Uterotonics and trial of labor on scarred uterus **(8)** and in resource poor nations, uterine rupture is more commonly associated with obstructed labor, injudicious obstetric interventions/manipulations, lack of ANC, grand multiparty, poor access to emergency obstetric care, poor socio-economic status, increasing maternal age and unwise use of Uterotonics **(3)**. The most common risk factors associated with uterine rupture in Ethiopia was obstructed labor, maternal age, multiparty, not attending ANC, poor Intrapartal follow up, labor duration > 18hrs and Instrumental delivery**(7, 9, 15)**.

Maternal mortality remains unacceptably high across many developing world especially in sub-Saharan Africa. More than 87% of maternal deaths from the global maternal mortality ratio of 210 deaths per 100,000 live births in 2013 was accounted by sub-Saharan Africa and South Asia **(10)**. Maternal mortality ratio from EDHS 2016 report was 412 per 100,000 live births **(11)**. Previously, the most common cause of maternal mortality in Ethiopia was abortion and its complications. But after starting the provision of save abortion service at health facility and also public awareness of use of birth control, maternal mortality due abortion and its complication decreased and obstructed labor and uterine rupture (36%) become the leading cause of maternal mortality **(12)**. Maternal consequences of uterine rupture includes severe hemorrhage, bladder injury, permanent infertility, neurologic injury, and even death. According to my literature review, the case fatality rates of uterine rupture in Ethiopia was 10.4%**(5)** and 6.6%**(6)** and factors associated with maternal death were not having ANC, pre-operative hypovolemic shock, severe anemia, relaparatomy and referred from >10km**(5, 6)**.

1.3. Significance of the study:

Since uterine rupture and obstructed labor is currently the leading cause of maternal mortality in Ethiopia and also with multiple adverse maternal and fetal consequences (12) and our hospital is one of the tertiary hospitals in the country with the highest delivery rate and also receives most referrals from district hospitals and health centers from where most cases of mothers with uterine rupture expected to occur. In addition to the above mentioned risk factors, quality of ANC follow up like early identification and referral of mothers with risk factor(s) for uterine rupture to appropriate facility during antepartum period was assessed and also there is no current study done in this hospital. Conducting this study would help us to know the magnitude of uterine rupture in this hospital and factors associated with uterine rupture and factors associated with maternal death. Based on the associated factors that would be identified according to this study, prevalence of uterine rupture will be decreased by capacity building of health professionals and also expansion of hospitals with OR set up especially to rural areas. This will also improve maternal outcome.

2. LITERATURE REVIEW:

Uterine rupture is the catastrophic event in obstetrics, often resulting in both maternal and fetal adverse consequences. It is one of the major Public health problem in developing countries especially sub-Saharan Africa endangering the life of many mothers. In Ethiopia, uterine rupture and obstructed labor together becomes the leading cause of maternal mortality accounting for about 36% of total maternal mortality in the country (12). The major risks associated with uterine rupture in developing countries are multi gravidity, advancing maternal age, poor socio-economic status, previous uterine scar, unsupervised labor, and unwise use of Uterotonics, neglected labor and lack of access to emergency obstetric service (3). In this study, magnitude, associated factors and factors associated with maternal death was investigated and the following seven literature review attempted to demonstrate this.

2.1. Magnitude of uterine rupture:

According to facility based cross-sectional study done in Debreworkos Hospital (2016), Mizan Aman General Hospital (2016) and Debreworkos referral Hospital (2017), the prevalence of uterine rupture in each hospital was 0.5% (1 in 200 deliveries), 1.6% (1 in 62.57 deliveries) and 2.25 % (1 in 41 deliveries) respectively (5-6, 9). According to 10-year retrospective study done in Nigeria (2016), incidence of uterine rupture was 0.58% (1 in 172 deliveries) and in South India (2017), the incidence of uterine rupture was 0.11% (1 in 915 deliveries) (13, 14).

2.2. Risk factors for uterine rupture:

According facility based cross-sectional studies done in Debreworkos Hospital (2016) and in Nigeria (2016) and case-control studies done in Suhul General Hospital (2016) and Mizan Tepi University Hospital (2017), the most common factors associated with uterine rupture were obstructed labor, inadequate utilization of ANC, living in distance >10km from the hospital, multiparity and poor Intrapartal follow up (7, 9 , 14-15). But according to prospective observational study done in South India (2107), the common factors associated with uterine rupture was previous uterine scar (13).

2.3. Management of mothers with uterine rupture

According to prospective observational study done in South India (2017) and facility based cross-sectional study done in Mizan Aman General Hospital (2016), the most common type of

uterine rupture was complete uterine rupture and the most common site of rupture was anterior low segment rupture followed by lateral rupture (5, 13). According to facility based cross-sectional study done in Debreworkos referral hospital (2017) and Mizan Aman General Hospital (2016), bladder rupture was found in around 9.9% and 2.6% of mothers with uterine rupture respectively (5, 6). According to my literature review, the most common types of surgery done for mothers with uterine rupture were in prospective observational study done in South India (2017) was SAH (56%) followed by repair with or without BTL, in facility based cross sectional study done in Debreworkos referral hospital (2017) was TAH (57%) followed by repair (27%) and in case-control study done in Mizan Tepi University hospitals was repair with or without BTL (87.3%) followed by SAH (12.7%) (6, 13, 15). Among mothers with uterine rupture, all mothers were transfused with blood in study done in south India (2017), but only 51.3% of mothers with uterine rupture transfused with blood in study done in Mizan Aman General Hospital (2016) and 39.44% of mothers with uterine rupture transfused with blood according to study done in Mizan Tepi University hospital (2017) (5, 13, 15). According to facility based cross-sectional study done in Mizan Aman General Hospital (2016), 53% of patients stayed in hospital for more than 7days and 47% of them stayed in hospital for 7 or less days and according to prospective observational study done in South India (2017), 44% of patients required admission to ICU (5, 13).

2.4. Maternal outcome and post-operative complications:

According to facility based cross-sectional study done in Mizan Aman General Hospital (2016), Debreworkos referral hospital (2017) and Benin teaching hospital, Nigeria, the case fatality rate of uterine rupture were 10.4%, 6.6% and 2.2% respectively and important factors associated with maternal death were having severe anemia, hypovolemic shock before operation, not having ANC follow up, relaparotomy and an initiation of labor at home (5-6, 14). The most common post-operative complications in cross-sectional study done Debreworkos hospital (2016) was anemia (50%), in study done in Mizan Aman General Hospital (2016) were post-operative wound infection (29.2%) followed by severe anemia (12.5%) and fistula (10.5) and in study done in South India (2017) were paralytic ileus (40%) followed by febrile morbidity (20%) and acute renal failure (16%) (5, 9, 13).

3. Objectives:

3.1. General objective:

-To assess the magnitude of uterine rupture and associated factors among mothers delivered at SPHMMC and Yekatit 12 Hospital from September 2015 to August 2017 G.C.

3.2. Specific objectives:

-To assess the magnitude of uterine rupture at SPHMMC and Yekatit 12 Hospital from September 2015 to August 2017 G.C.

-To assess associated factors for uterine rupture at SPHMMC and Yekatit 12 Hospital from September 2015 to August 2017

-To assess factors associated with maternal death in patients with uterine rupture at SPHMMC and Yekatit 12 Hospital from September 2015 to August 2017 G.C.

4. Methods:

4.1. Study setting

Study was conducted at St Paul hospital millennium medical college and Yekatit 12 Hospital OBGYN department. These hospitals are one of the tertiary hospitals in Addis Ababa and referral center for many health facilities in Addis and outside Addis Abeba. Both are the teaching hospital SPHMMC department of OBGYN has around 20 Gynecologists and Obstetrician and most of them had sub-specialty in different fields of Obstetrics and Gynecology, around 100 residents, mid-wives and interns and also Yekatit 12 HMC has around 10 Gynecologists and Obstetricians, interns and mid-wives. SPHMMC is a referral center for around 14 health centers in Addis Abeba, many private clinics and most of the referral from oromia region and with the average number of deliveries around 800-900 deliveries per month. Yekatit 12 HMC is also a referral center for around 9 health center in Addis Abeba and some referral from private clinic and oromia region and with the average number of deliveries around 400-500 deliveries per month. The OBGYN department is one of the major department in the hospitals.

4.2. Study Period:

-Study was conducted from May 1 to June 30, 2018.

4.3. Study design:

-Hospital based cross-sectional study design (both descriptive and analytical) was conducted.

4.4. Population:

4.4.1. Source population:

All mothers delivered at SPHMMC and Yekatit 12 Hospital during the study period.

4.4.2. Study population:

All mothers with uterine rupture managed at St Paul hospital and Yekatit 12 Hospital during the study period.

4.4.3. Inclusion criteria:

All mothers with uterine rupture that managed in St Paul hospital and Yekatit 12 Hospital during the study period was included.

Exclusion criteria

-Lost cards.

-Incidental finding of scar dehiscence because it may falsely improve maternal outcome of uterine rupture.

4.5. Sample size and sampling procedures:

4.5.1 Sample size:

Sample size was calculated using single population proportion formula and prevalence of 1.6% (which is the prevalence of uterine rupture in Mizan Aman General Hospital in 2016, Ethiopia according to my literature review (5)) was taken with 95% confidence interval and 5% margin of error.

$$N = \frac{z^2 P(1 - P)}{d^2}$$

Where d=allowable error of 5%, CI=confidence interval at 95%, N- Is the minimum possible sample size.

$$\text{Hence, } N = \frac{(1.96)^2 * 0.016(1-0.016)}{(0.05)^2} N = 24$$

By adding 10% for incomplete or lost cards, the minimum sample was 27.

4.5.2. Sampling procedures:-Convenience sampling technique will be used.

All cards of mothers with uterine rupture managed at st Paul hospital and Yekatit 12 Hospital from September 2015 to August 2017 G.C that fulfilled inclusion and exclusion criteria was included in the study.

4.6. Measurement:

4.6.1. Study Variables:

Dependent Variables: Magnitude of Uterine rupture, uterine rupture and maternal outcome

Independent variables:

Socio-demographic variables: Age, and place of referral

Obstetric Variables: GA, ANC visits, Parity, Induction/Augmentation, and duration of labor, Obstetric procedures, fetal weight, fetal presentation, previous uterine scar, obstructed labor and Use of partograph during labor.

Variables that determine maternal outcome: Type of rupture, Site of rupture, Speed of intervention, blood transfusion and maternal vital sign.

4.6.2. Instruments

Semi-structured questionnaires which contained history of ANC follow up, risk factors for uterine rupture, Intrapartum history, management, post op complications and maternal outcome.

4.7. Plan for data collection**4.7.1. Data collection method:**

Semi-structured questionnaires were used to collect secondary data from cards of mothers with uterine rupture managed at this hospitals during the study period based on inclusion and exclusion criteria.

4.7.2. Data collection tool:

Data was collected by using semi-structured questionnaires which was prepared in English language after reviewing different literatures, which contained socio-demographic variables, antepartum history, Intrapartum conditions, intra-operative conditions, post-operative conditions and maternal outcome of mothers with uterine rupture.

4.7.3. Data collection procedure:

Discussion was made with data collectors on how to collect data. Then, card number of mothers with the case of uterine rupture managed at St. Paul hospital and Yekatit 12 hospital from September, 2015 to August, 2017 G.C was identified from major operation room registration logbooks and Anesthesia registration logbooks. Then, all cards of mothers with uterine rupture during the study period was collected from card room by using these card numbers. Finally, based on the inclusion and exclusion criteria of the study, cards were selected and data for the study was collected. Cards with incomplete data (if 3 variables are missed) excluded.

4.8. Data Quality control:

To assure quality of data, properly designed data collection instruments (semi-structured questionnaires) was prepared. Discussion was made with data collectors by principal investigator. Everyday all of the collected data were reviewed and checked for completeness and relevance by principal investigator. The questionnaires were pre-tested on 5% of sample size in KolfeHC to check the completeness of the questionnaires and to check if there is lack of clarity in wording of the questionnaires. Since all cards of mother with uterine rupture were included in the study, there was no selection bias.

4.9. Data processing and analysis:

The collected data was checked for completeness and coded manually and then entered into software EPI-Info. Then, the data was transported to statistical program SPSS version 21 and analysed. Frequency distribution of both dependent and independent variables was worked out by using frequency tables in percentages and the association between independent and dependent variables was measured and tested using binary logistic regression. Binary analysis was done to assess statistical association between independent variables and maternal outcome and OR with their 95% CI was computed. All variables with p-value < 0.05 was considered to have statistically significant association with maternal outcome of uterine rupture.

4.10. Ethical Consideration:

Ethical approval was obtained from Ethical review board of SPHMMC. The procedure and purposes of the study was explained to the hospital dean. Then, St. Paul hospital and Yekatit 12 hospital gave permission to conduct the study. The patient's name was not included in the study. The patients' cards were properly handled. After we finished the data collection we returned patients' cards to card room. The information was used for study purpose only.

4.11. Operational Definition:

Augmentation of labor: Facilitating the existing labor using oxytocin or Prostaglandins.

Complete uterine rupture: Tearing of uterine wall involving endometrium, myometrium and serosa.

Grand multipara: Total number of deliveries of 5 and above after 28 weeks.

Gravidity: The total number of pregnancies (normal or abnormal).

Hydrocephalus: is a condition characterized by excessive accumulation of fluid (CSF) in the brain.

Hysterectomy: Surgical removal of the uterus

Incomplete uterine rupture: Tearing of uterine wall involving endometrium, myometrium but not serosa.

Incomplete cards-If more than 3 variables are missed.

Maternal mortality rate: Number of maternal death in given period per 100,000 women of reproductive age during the same time period.

Obstetric procedures: Instrumental delivery, External cephalic version, internal podalic version, breech Extraction.

Obstructed labor: Failure of descent of the fetus in the birth canal for mechanical reason despite good uterine contractions.

Para: Total number of delivery after 28 weeks of gestational age.

Prolonged labor: Labor duration greater or equal to 24hrs

Recto-vaginal fistula: Fistula between vagina and rectum due to birth trauma.

Shock: Maternal BP < 90/60 mmHg

Uterine rupture: Tearing of uterine wall during pregnancy and labor due to obstetric case (includes scar dehiscence).

Vesico-vaginal fistula: Fistula between vagina and bladder due to birth trauma.

4.12. Strength and Limitation of the study:

4.12.1. Strength of the study:

Since the study was conducted in hospitals with high delivery rate, most of the factors associated with uterine rupture and maternal outcome was identified.

4.12.2. Limitation of the study:

- It was a retrospective study.
- All cards were not retrieved, thus some study variables will be missed which may affect the study.
- Psychological, social and other long term post-operative consequences of the problem were not studied.

5. Result of the study:

Between September 1, 2015 to August 31, 2017 in SPHMMC and Yekatit 12 HMC, 63 cases of mothers with uterine rupture were registered, out of which cards of 57 mothers were retrieved from card room, but cards of 6 mothers were lost (and not included in the study) making non-response rate of 9.5%. Card retrieval rate of the study was 90.5% and all retrieved cards were included in the study.

Socio-demographic characteristics of mothers with uterine rupture

Between September 1, 2015 to August 31, 2017 in SPHMMC and Yekatit 12 HMC, the age of mother with uterine rupture ranged between 20 to 43 years. 42 (73.7%) patients belongs to age group of 19-34yrs followed by the age group greater than or equal to 35yrs of 15 (26.3%). See Table 1.

Table 1-Socio-demographic characteristics of mothers with uterine rupture managed at SPHMMC and Yekatit 12 HMC from September 1, 2015 to August 31, 2017 G.C.

Age (years)	Category	Frequency	Percentage (%)
	19-34	42	73.7
	35 and above	15	26.3
	Total	57	100

Magnitude of uterine rupture

In this study, the total number of deliveries from September 1, 2015 to August 31, 2017 at SPHMMC were 18,856 and at Yekatit 12 HMC were 9385 making total number of deliveries 28,241. Among these mothers, there were 63 mothers with uterine rupture managed in both hospitals (49 mothers with uterine rupture managed at SPHMMC and 14 mothers with uterine rupture managed at Yekatit 12 HMC). Based on these data, magnitude of uterine rupture in this study is 0.22% (1 in 448.3 deliveries). See table 2 below.

Table 2-Total number of deliveries and uterine rupture at SPHMMC and Yekatit 12 HMC from September, 2015 to August, 2017 G.C.

Hospitals	Total no of deliveries	Total no of uterine rupture	Magnitude of uterine rupture
SPHMMC	18856	49	0.26%
Yekatit 12 HMC	9385	14	0.15%
Total	28,241	63	0.22%

Associated factors for uterine rupture

1. Antepartum profile of mothers with uterine rupture

Among mothers with uterine rupture, 41(71.9%) mothers were P I-IV and 16 (28.1%) mothers were para V and above. 53 (93%) of mothers had at least one antenatal care and 4 (7%) of mothers had no antenatal care. Among mother who had ANC, 39 (73.6%) had ANC at HC and referred in labor from HC and 14 (26.4%) had ANC at Hospital. Among mothers who were referred from HC in labor, 22 (56.4%) mothers had indication for early referral during antepartum period (6 patients had previous cesarean scar, 10 patients were grand-multipara, 2 patients were with mal-presentation and 4 patients were with fetal congenital anomalies).

Gestational age of mothers with uterine rupture were <37wks in 2 (3.5%) mothers, between 37-42wks in 22 (38.6%) mothers, 42wks and above in 2 (3.5%) mothers and unknown date but 9months amenorrheic in 31 (54.4%) mothers. Among mothers with uterine rupture, fetal presentation were cephalic in 49 (86%) mothers, breech in 5 (8.7%) mothers and transverse in 3 (5.3%) mothers. Among mother with uterine rupture, 12 (21.1%) mothers had previous cesarean scar and 4 (7%) mothers had fetus with congenital malformation. See table 3 below.

Table 3-Antepartum profile of mother with uterine rupture managed at SPHMMC and Yekatit 12 HMC from September 1, 2015 to August 31, 2017 G.C.

Variables	Categories	Frequency	Percentage (%)
Parity	P I-IV	41	71.9
	P V and above	16	28.1
ANC	Yes	53	93
	No	4	7
Place of ANC	HC	39	73.6
	Hospital	14	26.4
Fetal presentation	Cephalic	49	86
	Breech	5	8.7
	Transverse	3	5.3
GA in weeks or months	<37	2	3.5
	37-42	22	38.6
	42 and above	2	3.5
	9 months	31	54.4
Previous cesarean scar	yes	12	21.1
	No	45	78.9
Co-morbid	HTN	8	14
conditions	Others	2	3.5

2. Labor and Delivery

Among mothers with uterine rupture, 51 (89.5%) mothers had spontaneous onset of labor and 6 (10.5%) mothers were induced by oxytocin. 40 (70.2%) patients had duration of labor less than 24hrs and 17 (29.8%) had labor duration greater or equal to 24hrs. Partograph was not used for 49 (86%) mothers and used for 8 (14%) mothers for labor follow up. Among mothers with uterine rupture, fetal weight were between 2500-3900g for 55 (96.5%) and greater or equal to 4000g for 2 (3.5%) patients. Among mothers with uterine rupture, 50 (87.7%) mothers delivered by laparotomy, 3 (5.3%) mothers delivered by instrument and 4 (7%) mothers by SVD.

Among mothers with uterine rupture, 6 (10.5%) occurred at SPHMMC, 8 (14%) occurred at Yekatit 12 HMC and 43 (75.5%) were referred from other facilities. Among those referred from other facilities, only 13 (30.2%) patients were diagnosed for uterine rupture on referral. The diagnosis of uterine rupture were made Intrapartum for 47 (82.4%) patients, intra-operative for 3 (5.3%) patients and postpartum for 7 (12.3%) patients. Among mothers with uterine rupture, 26 (45.6%) mothers were in shock and the remaining 31(54.4%) mothers were not in shock before operation. See table 4 below.

Table 4-Labor and delivery condition of mothers with uterine rupture managed at SPHMMC and Yekatit 12 HMC from September 1, 2015 to August 31, 2017.

Variables	Categories	Frequency	Percentage (%)
Types of labor	Spontaneous	51	89.5
	Induced	6	10.5
Duration of labor	<24hrs	40	70.2
	24hrs and above	17	29.8
Partograph used	Yes	8	14
	No	49	86
Fetal weight	2500-3900	55	96.5
	4000 and above	2	3.5
Mode of delivery	Laparotomy	50	87.7
	Instrumental	3	5.3
	SVD	4	7
Uterine rupture diagnosed	Intrapartum	47	82.4
	Intraoperative	3	5.3
	Postpartum	7	12.3
Rupture occurred at	SPHMMC	6	10.5
	Yekatit 12 HMC	8	14
	Other facilities	43	75.5

Patient in shock	Yes	26	45.6
	No	31	54.4

Factors Associated with uterine rupture

Among mothers with uterine rupture, 43.9% of them had obstructed labor, 21.1% of them had previous cesarean scar, 14% of them had Malpresentation, 10.7% of them were induced with Pitocin, 7% of them had baby with congenital malformation, 5.3% of them delivered by instrument and 3.5% of them delivered macrosomia baby. See table 5 below.

Table 5- Percentage distribution of possible causes of uterine rupture in mothers with uterine rupture managed at SPHMMC and Yekatit 12 HMC from September, 2015 to August, 2017 G.C.

Associated factors	Frequency	Percentages (%)
CPD/Obstructed labor	25	43.9
Previous C/S scar	12	21.1
Malpresentation	8	14
Induction	6	10.7
Congenital malformation	4	7
Instrumental delivery	3	5.3
Big baby	2	3.5

4. Type and Site of rupture and any associated injuries

Among mothers with uterine rupture, 43 (75.4%) patients had complete uterine rupture and 14 (24.6%) patients had incomplete uterine rupture. Among mothers with uterine rupture, 30 (52.6%) patients had lower uterine segment rupture, 20 (35.1%) patients had lateral rupture and 7 (12.3%) patients had posterior rupture. Among these mothers, 4 (7%) patients had associated bladder rupture which was repaired. See table 6 below.

Table 6-Type and Site of rupture and any associated injuries among mothers with uterine rupture managed at SPHMMC and Yekatit 12 HMC from September 1, 2015 to August 31, 2017.

Variables	Categories	Frequency	Percentage (%)
Types of rupture	Complete	43	75.4
	Incomplete	14	24.6
Sites of rupture	Anterior LUS	30	52.6
	Lateral	20	35.1
	Posterior	7	12.3
Associated injury	Bladder injury	4	7

Management of mothers with uterine rupture

Among mothers with uterine rupture, time interval between diagnosis of uterine rupture and intervention were within 30minutes of diagnosis for 42 (73.7%) patients and greater than 30 minutes for 15 (26.3%) patients. Among mothers with uterine rupture, TAH was done for 32 (56.1%) patients, SAH done for 5 (8.8%)patients, repair with BTL done for 3 (5.3%) patients and repair without BTL were done for 17 (29.8%) patients. 43 (75.4%) patients were transfused with blood and 14 (24.6%) patients were not transfused with blood. See table below 7.

Table 7- management of mothers with uterine rupture managed at SPHMMC and Yekatit 12 HMC from September 1, 2015 to August 31, 2017 G.C.

Variables	Categories	Frequency	Percentage (%)
Types of surgery	TAH	32	56.1
	SAH	5	8.8
	Repair without BTL	17	29.8
	Repair with BTL	3	5.3
Transfused with blood	Yes	43	75.4
	No	14	24.6

Maternal outcome and post-operative complications

Among mothers with uterine rupture, there were 4 (7%) maternal death (3 mother in post-operative period and one mother in intra-operative period) with possible cause of death being hemorrhagic shock for 3 mothers and sepsis with multiple organ failure in one mother and 53 (93%) mothers were discharged improved and case fatality rate was 7%. Only 3 (5.3%) patients with uterine rupture required admission to ICU. 30 (52.6%) patients were stayed in the hospital for greater than 7 days and 27 (47.4%) patients were stayed for 7 or less days in the hospital. According to information documented on the chart, 51 (89.5%) patients were diagnosed to have anemia, 4 (7%) patients with surgical site infection and 1 (1.8%) patients with pelvic collection. 19 (33.3%) mothers had hemoglobin level less or equal to 7g/dl and 38 (66.7%) patients had hemoglobin level greater than 7g/dl. Among mothers with uterine rupture, 8 (14%) had hypertension, 1 (1.8%) patients had chronic rheumatic valvular heart disease and 1 (1.8%) patient had HIV infected mother. See table 8 below.

Table 8-Maternal outcome, co-morbid conditions and post-operative complications of mother with uterine rupture managed at SPHMMC and Yekatit 12 HMC from September to August 31, 2017 G.C.

Variables	Categories	Frequency	Percentage (%)
Maternal outcome	Discharged Alive	53	93
	Died	4	7
Durations of hospital stay	7 or less days	27	47.4
	>7days	30	52.6
post-operative	Anemia	51	89.5
complications	SSI	4	7
	Pelvic collection	1	1.8
ICU admission	Yes	3	5.3

	No	54	94.7
Hemoglobin level (g/dl)	7 or less	19	33.3
	>7	38	66.7

1. Factors associated with maternal outcome

The result of this study on binary logistic analysis showed there is no association between maternal outcome and grand-multiparity (OR=9.23; 95%CI: 0.882, 96.604), duration of labor greater than 24hrs (OR=8.357; 95% CI :0.802, 87.114), maternal vital sign before operation (OR=5.129; 95% CI: 0.455, 13.6) and speed of intervention (OR= 10.250; 95% CI : 0.975, 107.78), hemoglobin level, ANC follow up, place of ANC follow up, maternal age, type and site of rupture, type of operation, time of diagnosis of uterine rupture and blood transfusion (**P> 0.05**). See table 9.

Table 9-Binary analysis of independent variables and maternal outcomes among mothers with uterine rupture managed at SPHMMC and Yekatit 12 HMC from September 1, 2015 to August 31, 2017 G.C.

Categories	Maternal outcome		OR(95% CI)	P value
	Survived	Died		
	Age(in years)		1	
20-34	40	2	3.077(0.393, 24.073)	0.265
35-49	13	2		
	Parity			
PI-IV	40	1	1	
PV and above	13	3	9.23(0.882, 96.604)	0.064
	ANC follow up			
Yes	49	4		0.569
No	4	0	0.925(0.856, 0.998)	
	Place of ANC follow up			
HC	37	2	1.649(0.173,3.35)	0.439
Hospital	12	2		
	Hemoglobin level			
7 and less	16	3	3.361(0.465,12)	0.067
>7	37	1		
	Blood transfusion			
Transfused	39	4		

Not transfused	14	0	1.401(0.275, 8.9)	0.237
	Type of rupture			
Complete	39	4	1.1401(0.248,9.623)	0.237
Incomplete	14	0		
	Site of rupture			
Anterior LUS	28	2		
Lateral	18	2	0.807(0.231,1.46)	0.668
Posterior	7	0		
	Duration of labor			
<24hrs	39	1	1	
24hrs and above	14	3	8.357(0.802, 87.114)	0.076
	Patient in shock before operation			
Yes	22	4	5.129(0.455,13.6)	0.999
No	31	0		
	Gestational Age(weeks)			
<37	2	0		
37-42	19	3	2.462(0.3,14.7)	0.482
>=42	2	0		
9months	30	1		

	Speed of intervention (minutes)			
30 and less	41	1	1	
>30	12	3	10.250(0.975, 107.78)	0.053
	Time of diagnosis of Rupture			
Intrapartum	44	3		
Intraoperative	3	0	0.822(0.8, 1)	0.663
Postpartum	6	1		
	Partograph used			
Yes	7	2	1	
No	46	2	5.333(1.376, 20.690)	0.081

Statistically significant at P-value < 0.05

6, Discussion

Uterine rupture is the catastrophic event in obstetrics, often resulting in both maternal and fetal adverse consequences. It is one of the major cause of maternal morbidity and mortality in resource poor nations, particularly Africa. Between September 1, 2015 to August 31, 2017 in SPHMMC and Yekatit 12 HMC, total number of deliveries were 28,241 and there were 63 cases of mothers with uterine rupture managed at these hospitals making magnitudes of uterine rupture in the study area 0.22% (1 in 448.3 deliveries). The most important factor associated with uterine rupture in this study was parity of mothers and the case fatality rate of uterine rupture in this study was 7%. In this study, the most important factors associated with maternal outcome was parity of mothers.

The magnitude of uterine rupture in this study during the study period was 0.22% (1 in 448.3 deliveries) which is comparable to study done in south India where the incidence were 0.11%, but lower than study done in Nigeria, University of Benin teaching Hospital, where the incidence were 0.58%, in Debreworkos Hospital, Ethiopia where the incidence were 1 in 200 deliveries, in Mizan Aman general Hospital, Ethiopia where the incidence were 1.6% and in Debreworkos referral Hospital where the incidence were 2.24%. The difference will be due to difference in availabilities of healthy facilities, availability of medical supplies and skilled healthy professional (2-6).

In this study, 43.9% of mothers with uterine rupture had obstructed labor which may be similar to study done in Debreworkos Hospital, Suhul General Hospital and Mizan Tepi University Hospital where the most common cause of uterine rupture were obstructed labor, but in contrast to study done in South India where the common cause of uterine rupture was previous scar and study done in Nigeria where the common factors associated with uterine rupture was inadequate utilization of ANC (7, 9, 13-15).

The difference may be due to difference in socio-demographic and obstetric characteristics of women managed at each hospital and also difference in number of pregnant mother with previous cesarean scar, availability of healthy facilities and other obstetric profiles (2-5, 7-8).

In this study, among mother with uterine rupture, 43 (75.4%) patients had complete uterine rupture and 14 (24.6%) patients had incomplete uterine rupture which is similar to study done in south India where rupture was complete in 84% of cases and incomplete in 12% of cases and

study done in Mizan Aman general Hospital, Ethiopia where uterine rupture were complete in 88.7% and incomplete in 11.3% of cases (2, 5). In this study, among mothers with uterine rupture, 30 (52.6%) patients had anterior lower uterine segment rupture, 20 (35.1%) patients had lateral rupture and 7 (12.3%) patients had posterior rupture and no documented mixed type which is similar to study done in South India where 52% of mothers had anterior lower uterine segment rupture followed by lateral and posterior rupture and study done in Mizan Aman general Hospital with the common site of rupture being anterior low transverse rupture in 33% of cases and anterior low vertical in 19.5% and no documented mixed type (2, 5). In this study, bladder rupture occurred in 4 (7%) patients which is comparable to study done in Debreworkos referral Hospital, Ethiopia where there was associated bladder rupture in 9.9% of cases but slightly higher as compared with study done in Mizan Aman general Hospital which is 2.6%. The difference in bladder rupture may be due to difference in site of rupture and duration of uterine rupture before intervention (5, 6).

In this study among mothers with uterine rupture, TAH was done for 32 (56.1%) patients, SAH done for 5 (8.8%) patients, repair without BTL were done for 17 (29.8%) patients and repair with BTL done for 3 (5.3%) patients, which is similar to study done in Debreworkos referral Hospital, Ethiopia where TAH was performed for 57% of cases and Sub-TAH in 16.9% of cases and uterine repair was done for 27% of cases (for 23.3% repair with BTL and for 3.7% of cases repair without BTL was done) and but in contrary to study done in south India where SAH was done for 56% of mothers and repair with or without BTL done for 44% of them, study done in Mizan-Tepi University Hospital where repair with BTL done for 47.9% of cases, repair without BTL done for 39.4% of cases and SAH done for 12.7% of cases. The options of surgical treatment of uterine rupture were depends on various factors; the condition of patients, extent of rupture, presence of infection, the wish for future child bearing capability and experience of surgeons and availability of blood transfusion were the determining factors for decision (2, 5-6, 8).

In this study, 43 (75.4%) patients were transfused with blood and 14 (24.6%) patients were not transfused with blood which is in contrast to study done in South India where all mothers with uterine rupture transfused with blood, in study done in Mizan-Tepi University Hospital where only 39.44% of cases received blood transfusion and study done in Mizan Aman general

Hospital where only 51.3% of cases were transfused with blood. The difference in blood transfusion can be explained by difference in availability of blood and extent of bleeding(2, 5-6, 8). In this study, 30 (52.6%) patients stayed in Hospital for greater than 7 days and 27 (47.4%) patients stayed for 7 or less days in the hospital which is similar to study done in Mizan Aman general Hospital where 53% of cases stayed for greater than 7days and 47% of cases stayed for 7 or less days in Hospital (5). In this study, only 3 (5.3%) patients with uterine rupture required admission to ICU which is in contrary to study done in South India where 44% of them required admission to ICU. The difference may be due to difference in patient profile and difference in availability of ICU (2).

The case fatality rate of uterine rupture in this study was 7%, which is comparable to study done in Debrework referral Hospital with the case fatality rate of 6.6% and study done in Mizan Aman general Hospital with the case fatality rate of 10.4%, but higher than study done in Nigeria with case fatality rate of 2.2%. In this study, there was no identified factors associated with maternal outcome (P-value >0.05) which is in contrast to study done in Mizan Aman general hospital where the most important factors associated with maternal outcome were hemoglobin level, blood transfusion, relaparotomy, and ANC follow. The difference could be explained by difference in study design and sample size (3, 5-6). According to this study, the most common post-operative complications were anemia in 51 (89.5%) patients followed by surgical site infection in 4 (7%) patients and pelvic collection in 1 (1.8%) patients, which is similar to study done in Debrework Hospital, Ethiopia which showed that the most common post-operative complications were anemia in 50% of cases but in contrast to study done in Mizan Aman general Hospital which showed that the most common post-operative complications were post-operative wound infection in 29.2% of patients followed by anemia in 12.5% of patients, fistula in 10.5% of patients and pneumonia in 8.3% of patients and study done in south India where the common post-operative complications were paralytic ileus in 40% of patients followed by febrile morbidity in 20% of patients and acute renal failure in 16% of patients (2, 5-6). According to this study, the most common co-morbid conditions in mothers with uterine rupture is Hypertension in 8 (14%) patients, chronic rheumatic valvular heart disease in 1 (1.8%) patients and 1(1.8%) HIV infected mother, but none of these mothers died.

7, Conclusion:

The magnitude of uterine rupture in the study area was low as compared to the previous study done in Ethiopia. Among mothers with uterine rupture, 43.9% of them had CPD/ obstructed labor

8, Recommendation:

-Health professionals at health centers needs to be updated on identification and early referral of pregnant mothers who have risk factors for uterine rupture to appropriate hospital during antepartum period because most of mothers with uterine rupture had ANC follow up at health center and referred after uterine rupture.

-I also recommend further research with larger sample size.

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ANNEX

Annex-1- Data collection instruments:

I. Socio-demographic characteristics:

1. Maternal age-----
2. Referred from-----

II. Information on pregnancy and ANC follow up:

1. What was the parity of the mother? -----
2. What was the GA in weeks-----or if unknown in months-----?
A. <37wks B. 37-42wks C. ≥42wks
3. Did she had ANC follow up?
A. Yes B. No
4. If she had ANC follow up, number of ANC she visited (if specified) -----
5. If the answer is “yes” for question number 3, where was the place of her ANC follow up?
A. St Paul hospital B. Catchment HC
C. Others: Specify-----
6. If referred from HC or other facility in labor, did she had indication for referral to appropriate facility (hospital) during antepartum period?
A Yes B. No
7. If “yes” to question number 6, what was the indication for this early referral?
A. Previous uterine scar B. Grand multiparty C. Big baby
D. Malpresentation; specify type of Malpresentation----
E. Other; specify—
8. If the mother has previous uterine scar, the type of scar
A. Previous cesarean scar: Type of incision-----and Number of scar-----.
B. Previous myomectomy scar
C. Other; specify-----

III. Information on labor, delivery and management:

1. Mode of onset of labor?

A. Spontaneous B. Induced

2. If induced, what was the medication used?

A. Oxytocin B. Prostaglandins

C. Other, specify-----

3. Duration of labor in hours-----

4. Was the partograph used for labor follow up?

A. Yes B. No

5. Did the mother had risk factor for uterine rupture?

A. Yes B. No

6. If “yes” to question number 5, what was that risk factor(s)?

(More than one answer is possible)

- | | |
|--------------------------|---------------------------|
| A. Previous uterine scar | F. Destructive delivery. |
| B. Malpresentation | G. Induction/Augmentation |
| C. Big baby | H. Instrumental delivery |
| D. Obstructed labor | |
| E. Prolonged labor | I. Other, specify----- |

7. Where was the uterine rupture occurred?

- A. At St Paul hospital
B. Catchment HC
E. Other, specify-----

8. If this mother was referred from other facility, what was the Diagnosis on referral? -----

9. If this mother was referred from other facility, what was the Time interval between referral and arrival to st Paul? -----

10. What was the time interval between diagnoses of uterine rupture at st Paul and operation? ----

11. What was the maternal blood pressure before surgery?

Blood pressure=

12. When was uterine rupture diagnosed?

A. Intrapartum B. Intra-operative C. Post-partum

13. What was the fetal presentation? -----

14. What was the fetal weight in gram-----?

15. What was the type of rupture?

A. Complete rupture B. Incomplete rupture

16. Site of rupture:

A. Anterior LUS transverse D. Posterior

B. Anterior low vertical E. Fundal

C. Lateral F. Mixed, Specify-----

17. Specify if there was any associated pelvic organ injuries -----

18. Type of surgery:

A. TAH C. Repair with BTL

B. Subtotal Hysterectomy (SAH) D. Repair without BTL

19. Was she transfused with blood? A. Yes B. No

20. If “yes” to the above question, what blood component and

Number of unit transfused? -----

21. What was the maternal Hemoglobin? -----

IV-Post-operative conditions and maternal outcome:

1. Any post op complication the mother developed?

A. Obstetric fistula, specify----- F. Post-operative sepsis; specify-----

B. Anemia G. Paralytic ileus

C. Surgical site infection H. Post op psychosis

D. Wound dehiscence I. Other; specify-----

E. Pelvic collection

2. Was the mother required admission to ICU?

A. Yes B. No

3. If “yes” to the above, for how many days? -----

4. Total duration of stay in the hospital after operation (in days) -----

5. What was the maternal outcome?

A. Discharged alive

B. Died

6. If died, what was the immediate cause of death?
- A. Sepsis with multiple organ failure
 - B. Hemorrhagic shock
 - C. Anemia
 - D. Anesthesia complication
 - E. Other, specify-----
7. Specify any co-morbid conditions the mother had-----