

## Burden of Uterine Rupture and Feto-Maternal Outcome in a Tertiary Health Facility, Northwestern Nigeria: A Prospective Study.

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### ABSTRACT

**Introduction:** Uterine rupture is an obstetric emergency with unacceptably high perinatal and maternal morbidity and mortality especially in areas with poorly developed maternal and child health care services. **Aim:** To determine the incidence, patient's socio-demographic characteristics, possible risk factors and feto-maternal outcome of uterine rupture. **Methodology:** This was a 1-year prospective study of all cases of uterine rupture managed at Federal Teaching Hospital, Birnin Kebbi, between 1st August 2023 and 31st July, 2024. Relevant information was gotten from the patients and the care givers, the medical records in both Labour ward, Maternity theatre, Postnatal Ward, Intensive Care Unit and Special Baby Care Unit (SCBU), and analyzed using SPSS software (Chicago version 26). **Result:** There were 30 cases of uterine rupture out of the 1,884 deliveries giving an incidence rate of 0.61% or 1 in 62.8 deliveries. Their ages ranges between 28 to 41yrs with mean age 37.47 SD  $\pm$ 2.36yrs. About 18 (60%) patients had scared uterus, 17 of which are from previous caesarean section (94.4%) and most (90%) were unbooked. The commonest site of rupture was anterior (62.2%). All the patients had laparotomy; 25(83.3%) had sub-total hysterectomy, 3 (10.0%) had repair plus BTL while one of them had repair only. A single case of maternal mortality was recorded with maternal mortality ration of 51.3cper 100,000. The perinatal mortality rate was 14.1 per 1000 live birth. **Conclusion:** Uterine rupture remains a significant health risk to our women during child birth.

**Keywords:** Uterine rupture, Burden, Risk factors, Feto-maternal outcome, Nigeria

### INTRODUCTION

A uterine rupture is a complete division of all the three layers of the uterus: the endometrium, myometrium, and perimetrium (serosa). Uterine rupture can cause serious morbidity and mortality for both the woman and the neonate . Most uterine ruptures occur in pregnant women, though it has been reported in non-pregnant women when the uterus is exposed to trauma, infection, or malignancy (Herrera *et al*, 2011). While uterine dehiscence is a similar condition characterized by incomplete division of the uterus that does not penetrate the three uterine layers and often is an occult finding in an asymptomatic patient (Guiliano *et al*, 2014). The uterine wall, or myometrium, is

weakened in conditions such as Ehlers-Danlos and Loeys-Dietz, which increases the risk of rupture (Russo *et al*, 2018), Prolonged uterine exposure to oxytocin and other uterotonic medications is also an important risk (ACOG, 2019). Other conditions such as macrosomia, polyhydramnios, multiple gestation pregnancy, and uterine anomalies such as fibroids can stretch the myometrium beyond its optimal range (ACOG, 2019). These conditions are also associated with a higher risk of uterine rupture. There is also evidence that multiparity may increase the risk of rupture (Gibbins *et al*, 2015).

The rate of uterine rupture with an unscarred uterus has been found to be approximately one rupture per 10,000 to 25,000 deliveries (Al-zirqi *et al*, 202017 and Toppenberg *et al*, 2002). The incidence of unscarred uterine rupture is found to be higher in developing countries (Berthe *et al*, 2014). It is hypothesized that this rate is higher because of lack of comprehensive obstetric care, poor health seeking behavior, poverty as well as techniques to manage obstructed labor, such as destructive deliveries and cesarean delivery, are less readily available (Barthe *et al*, 2014). While the incidence and case fatality are low in developed countries the opposite is true for developing countries with rising incidence and case fatality partly due to prolonged obstructed labour, very deplorable health care services occasioned by long standing neglect by relevant authorities, dismal health care financing, poverty, illiteracy, women aversion to early and timely operative interventions, un-regulated activities of unskilled birth attendants and inappropriate use of uterotonics (Golan *et al*, 1980 and Schrinky *et al*, 1978). Globally the incidence of uterine rupture is low, 1 in 1416 (0.07%) pregnancies, the incidence among women with unscarred uteri in developed countries is even lower; 1 in 8434 (0.012%) however there is an 8 folds increase incidence of 0.11% (1 in 920) in developing countries (Nahum GG & Qaynh K, 2018). In Nigeria reported rates of uterine rupture are 1 in 164 (0.61%), 1 in 172 (0.58%), 1 in 103 (0.97%), 1 in 210 (0.47%), 1 in 143 (0.7%), 1 in 74 (1.34%), 1 in 238 (0.42%) and 1 in 117 (0.85%) deliveries in Lagos, Benin city, Enugu, Ilorin, Keffi, Gusau, Sokoto, Katsina and Abuja respectively [Adeboala *et al*, 2017, Osemwenkhah *et al*, 2016, Ezegwui *et al*, 2005, Aboyije *et al*, 2001, Akaba *et al*, 2013, Ochima O and Tivkaa TD, 2020, Mohammed *et al*, 2023, Ekele *et al*, 2000]. Common predisposing factors to uterine rupture includes: neglected obstructed labour, grandmultiparity, scarred uterus, women aversion to early and timely operative deliveries which is seen as obstetric failure compounded by ignorance and illiteracy, others are uterine instrumentation, blunt abdominal trauma and inappropriate use of uterotonics (Adeboala *et al*, 2017). Some of the known fetal complications includes need for admission into Special Baby Care Unit (SCBU), fetal hypoxia and perinatal or neonatal death while obstetric haemorrhage, hypovolemic shock, hysterectomy and death are maternal complications especially when cases present late and medical care is suboptimal.

## **MATERIALS AND METHODS**

This is a hospital based prospective study conducted among all pregnant women with ruptured uterus who presents as a referral, self-referred or were in labour in labour ward of the Federal Teaching hospital, Birnin Kebbi using an interviewer administered structured questionnaire. The study was carried out over one year period (1<sup>st</sup> August, 2023 to 30<sup>th</sup> July, 2024). The study included both booked and unbooked women with complete uterine rupture and women with incomplete uterine rupture. Every

patient was counseled and informed of the study and written consents were obtained from them and their confidentiality was assured. Maternal socio-demographic and obstetric characteristics, clinical signs, and symptoms during labor, intra-operative findings, complications as well as perinatal maternal morbidities and mortalities were recorded. Data collated was entered into and analyzed using Software package for social sciences (SPSS) (Chicago version 26). The main outcome measures were incidence of complete uterine rupture and uterine rupture with adverse outcome and adverse outcome defined as major obstetric hemorrhage/blood transfusion, hysterectomy, Intensive Care Unit (ICU) admission, perinatal asphyxia and/or neonatal intensive care unit admission and perinatal mortality.

## RESULT

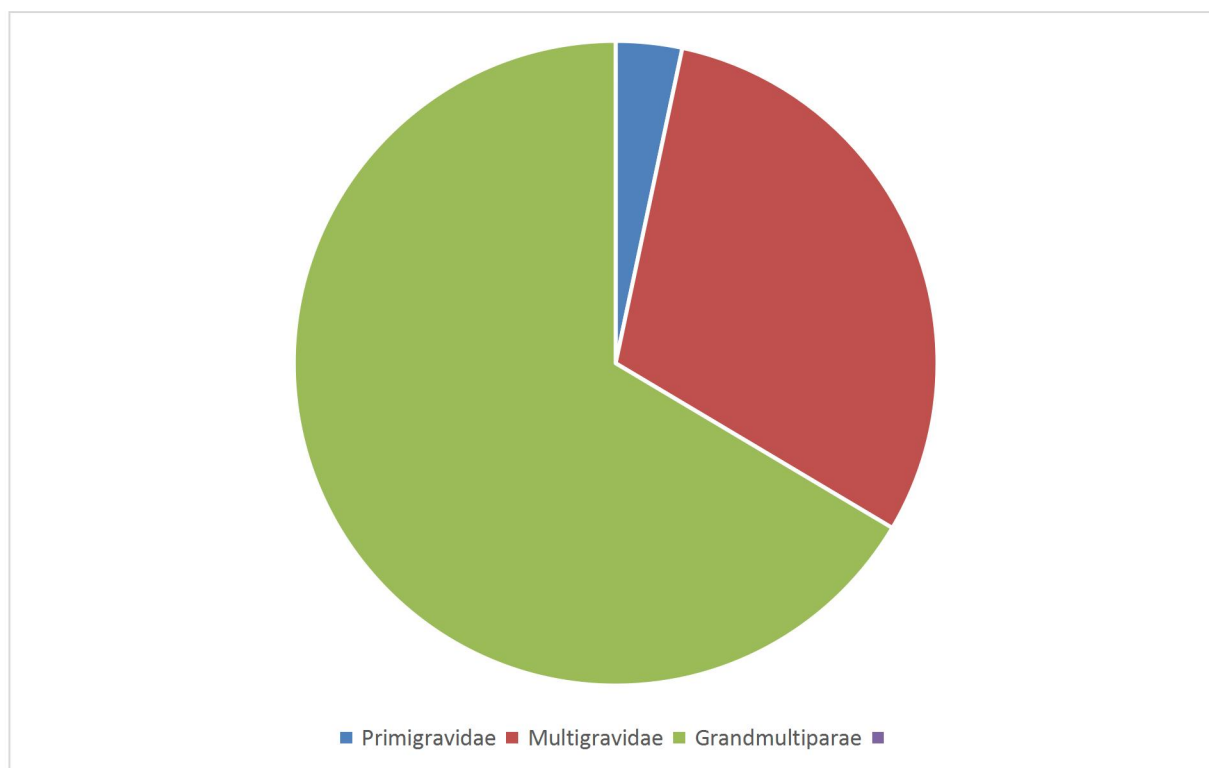
During the study period, there were 30 cases of uterine rupture with total of 1,884 deliveries giving an incidence of 1 in 62.8 (6.1/1000 (0.61%)) deliveries. The age range of the studied patients ranges between 28 to 41yrs with mean age 37.47 SD  $\pm$ 2.36yrs. Twenty-six (86.7%) of the women had no any form of formal education, 3 (10%) had secondary school education and while none of them had tertiary level of education. Majority (83.3%) of the women were Hausas while 16.7% belongs to the other ethnic groups. Twenty-nine (96.7%) were Muslims. This is shown in table 1 below.

**Table 1 shows the sociodemographic characteristics of the patients.**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age (yrs)</b>		
15-25	4	13.30
26-35	17	56.70
36-45	9	30.00
$\geq$ 46	0	0.00
<b>Tribe:</b>		
Hausa	25	83.30
Yoruba	0	0.00
Igbos	0	0.00
Others	5	5.00
<b>Religion</b>		
Islam	29	93.30
Christianity	1	12.70
Others	0	0.00
<b>Educational Level</b>		
No formal Edu	26	66.70
Primary	0	0.00
Secondary	3	10.00
Tertiary	1	3.30
<b>Parity</b>		
Primigravida	1	3.30
Multigravida	9	30.00
Grandmultipara	20	66.70
<b>Booking status</b>		

Booked	3	10.00
Not booked	27	30.00

Majority of the women, as shown in the figure 1 below. Out of them, 13 (43.3%) had obstructed labour (Primigravidae:1, Multigravidae:3 and Grandmultiparae:9) with p value of 0.428. This is shown in the table 2 below.



**Figure 1: Parity distribution among study participants**

Eighteen (60%) of the women had previous uterine surgery. Seventeen (56.7%) were previous caeserean section while 1 was previous uterine repair (CI;1.32 and OR;0.78). Thirteen of them was one previous caesarean section while 4 was 2 previous Caeserean section. Thirteen (43.3%) of the studied women had obstructed labour from various causes while misoprostol, oxytocin and combination of misoprostol use was implicated in 3 (10.0%) of the patients. Abdominal pain was the most common symptom identified and was present in 27 (90%) cases. Abdominal tenderness and abdominal distension were the most common general signs seen in 27 (90.00%) of the cases. Pallor and tachycardia were also seen in 27 (90.00%) of the cases. Easily palpable fetal parts and vaginal bleeding were seen in 24 (80.00%) of cases. Many patients, however, had multiple symptoms and signs. This is shown in the table 2 below

**Table 2: Obstetrics characteristics and clinical characteristics of women with rupture uterus.**

<b>Variables</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Previous Uterine Surgery		
Yes	19	63.30
No	11	36.70
Type of Surgery		
CS	18	94.70
Uterine repair	1	5.30
Type of CS		
Lower segment CS	18	100.00
Classical CS	0	0.00
Labour Onset		
Spontaneous	20	66.70
Induced	10	33.30
Place of induction		
At home	5	50.00
PHC	3	30.00
Private Health Facility	0	0.00
General Hospital	2	20.00
Tertiary Health Centre	0	0.00
Our Facility	0	0.00
Agents of induction		
Intra-cervical catheter	0	0.00
Misoprostol	3	30.00
Oxytocin	3	30.00
Misoprostol and Oxytocin	4	40.00
Obstructed labour		
Yes	12	30.00
No	18	70.00
Site of uterine rupture		
Lower segment	8	26.70
Upper segment	0	0.00
Lateral	8	26.70
Posterior	0	0.00
Multiple site	14	46.60
Type of rupture		
Incomplete	27	90.00
Complete	3	10.00
Type of surgery done;		
Uterine repair only	0	0.00
Uterine repair with BTL	4	13.30
Sub-total Hysterectomy	25	83.40
Hysterectomy with bladder repair	1	3.30
Perinatal outcome		
Live birth	3	10.00

NICU admission	0	0.00
Early neonatal death	0	0.00
IUFD	27	90.00
<b>Maternal Outcome</b>		
Alive	27	90.00
Alive with morbidities	2	6.70
Maternal death	1	3.30

The odds ratio for uterine rupture from previous caesarean section, obstructed labor, Misoprostol, injudicious oxytocin and combined misoprostole-oxytocin usage were 0.7653, 0.4138, 0.1747, 0.0852, 0.0661, and 0.0253, respectively. Comparing previous caesarean section and obstructed labor, the odds ratio of uterine rupture was 2.1273 (95% confidence interval [CI] of 1.2331–3.9134),  $P = 0.0216$ . Furthermore, comparing previous caesarean section and injudicious oxytocin usage, the odds ratio of uterine rupture was 3.6571 (95% CI of 2.1382–5.736),  $P = 0.04$ . However, comparing obstructed labor and injudicious oxytocin usage, the odds ratio of uterine rupture was 1.8701 (95% CI of 0.8054–4.3424),  $P; 0.1416$ .

**Table 3: Relationship between individual risks**

<b>VARIABLES</b>			<b>TOTAL</b>	<b><i>P</i></b>
				<b><i>value</i></b>
<b>Obstructed Labour</b>	Yes	No	Total	
<b>Parity</b>				
Primigravida	0	1	1	
Multigravida	4	5	9	
Grandmultipara	9	11	20	
<b>Type of Surgery</b>	Repair with BTL	Subtotal	Total	
		Hysterectomy		
<b>Type of Rupture</b>				
Complete	5	22	27	
Complete	1	2	3	
<b>Type of rupture</b>	Complete Rupture	Incomplete rupture		
<b>Number of previous CS</b>				
None	11	2	13	
One	12	1	13	
Two	4	0	4	
Three	0	0	0	
<b>Total</b>	<b>27</b>	<b>3</b>	<b>30</b>	0.940
<b>Complete</b>	1	26	27	
<b>Incomplete</b>	2	1	3	
<b>Labour onset</b>	<b>Spontaneous</b>	<b>Induced</b>		
<b>Site of rupture</b>				
<b>Lower segment</b>	7	9	16	
<b>Lateral</b>	1	5	6	

<b>Posterior</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Multiple site</b>	<b>4</b>	<b>4</b>	<b>8</b>	
<b>Total</b>	<b>12</b>	<b>18</b>	<b>30</b>	<b>2.327</b>

Of the 30 women, 26 (80%) had Sub-total Hysterectomy while 4 of them had repair with BTL. Eight women had anterior lower-segment rupture, 8 of them was also lateral rupture and 14 women had multiple sites rupture. None of the women had posterior rupture. Majority, 25 (83.4%) of the patients had sub-total hysterectomy done 25, while repair with bilateral tubal ligation (BTL) was done in 4 (13.3%) of the cases and 1 (3.3%) patient had sub-hysterectomy with urinary bladder repair. None of the cases had repair only. The most common postoperative complication was anemia with packed cell volume <30% which occurred in 29 (96.33%) of the cases. Others include wound infection 6 (20.00%); and renal failure 3 (10.00%). Two (2.99%) of the cases reviewed developed depression in the postoperative period.

One woman (3.3%), however, died after the surgery at Intensive Care Unit (ICU) due to major intra-operative complications given the Maternal Mortality Ratio (MMR) of 53.1 per 100,000 deliveries. Maternal comorbidities occurred in the postoperative period with hospital stay >14 days occurring in 10 (33.67%) of the women. Majority of the patients had more than one complication. Twenty-seven of the fetuses were stillborn and only 3 were delivered alive given a perinatal mortality rate of 14.3 per 1,000 live birth.

## DISCUSSION

Uterine rupture remained an important obstetrics catastrophe with associated high maternal and perinatal morbidity as well as mortality, especially in low and middle-income countries with inadequate obstetric services compounded by poor health seeking behaviour of parturients. (Guiliano *et al*, 2014). The incidence of uterine rupture in this study was (0.61%). This was similar to the 0.62% in Nnewi (Mbamara *et al*, 2012) 0.61% in Lagos, (Adegbola O and Odeseeye, 2017) 0.58% in Benin, (Osemwenkha *et al*, 2016). However, its lower than the 2.44% recorded in Ethiopia. (Schrinsky *et al*, 1978), 1.03% in Bayelsa (Eze *et al*, 2017), 1.0% in Enugu (Ezegwui *et al*, 2005) and 0.85% in Abuja, (Akaba *et al*, 2013), but was however higher than the 0.06% in Netherlands (Nahum GG and Qaynh K, 2018). The wide variation could be largely related to the variation in the availability of efficient and affordable maternity care, health seeking behavior as well as level of literacy and socio-economic status of the populace. Others may be demographic characteristics and time of the studies.

The majority (93.3%) of the women in this study did not booked their pregnancies for antenatal care, hence their risks for uterine rupture could not be identified and properly planned their deliveries during the antenatal period. A similar occurrence of uterine rupture mainly among unbooked patients has also been noted in other studies (Guiliano *et al*, 2014, Russo *et al*, 2018, Al-zirqi *et al*, 2017, Osemwenkha *et al*, 2016, Ezegwui *et al*, 2005). It is not a surprise because most of the referring centres offer a lower standard of care due to the absence of specialists. The main risk factor for uterine rupture observed in this study was grandmultiparity 66.7% a previous uterine scar, 60%. This was similar to the findings in Lagos (Adegbola O and Odeseeye, 2017), Benin, (Osemwenkha *et al*,

2016) Nnewi, (Mbamara et al, 2012) but was different from studies in Ilorin (Abayegi *et al*, 2001) and Ethiopia (Schrinsky *et al*, 1978) where oxytocin use and obstructed labour respectively, were the major causes of uterine rupture. Previously, obstructed labour used to be the commonest risk factor but because of the global rise in caesarean section rate, coupled with improved uptake in antenatal care services over the years, the concept of obstetric transition, there seems to be shift towards previous uterine scar because of increasing caesarean section, however these are still the problems in our environments. Abdominal pain and vaginal bleeding were the commonest presenting complaints from women with uterine rupture recorded in this study. This was also similar to the findings in Lagos (Adegbola O and Odeseeye, 2017). Rupture of the uterus along the previous scar 16 (53.3%) was the commonest site for uterine rupture as seen in this study. This was similar to the study conducted in Lagos, however, this was different from some other studies that simply identify the anterior wall of the uterus as the commonest site of rupture without being further specific. (Harrera *et al*, 2011, Russo *et al*, 2018, Abayegi *et al*, 2001, Akaba *et al*, 2013). The management of uterine rupture starts with active resuscitation using plasma expanders and transfusion with blood with concurrent definitive surgical treatment planned. This definitive treatment should be individualized depending on the patient's clinical state, future reproductive wish, age, the skill of the surgeon, extent of the consent given by the patient, and type and extent of the rupture (Nahum GG and Qaynh K, 2018, Eze *et al*, 2017). The easiest and shortest procedure should be attempted in each case as speed is of the essence in the management of uterine rupture. Hysterectomy was the commonest 25 (83.4%) surgical procedure carried out in this study and was similar to findings in other studies [4,6,16]. This is due to the fact it was the safest procedure in those women because of the late presentation and extent of the uterine rupture, these were similar to the factors considered in patients that had hysterectomy from many other studies. Uterine repair and bilateral tubal ligation (BTL) was however the commonest intervention reported in some other studies (Harrera *et al* , 2011, Aboyeji *et al*, 2001). This was followed by uterine repair plus bilateral tubal ligation 4 (13.3%) and then the lone case of uterine repair in the primigravidae in this study. Anaemia requiring multiple blood transfusions in 27(90.0%) the study participants were the commonest post-operative complications and then followed by wound infection and Intensive Care Unit (ICU) admission. This was similar to what was reported from other studies (Adegbola O and Adeseye AK, 2017, Osemwenkha *et al*, 2016, Akaba *et al*, 202013). Other co-morbidities noted in this were the; bladder injury and acute renal failure. There was only 1 (3.3%) maternal death recorded in this study giving a Maternal Mortality Ratio (MMR) of 53.1 per 100,000 deliveries while 52(88.1%) stillbirths were delivered giving a Perinatal Mortality Rate (PMR) of 14.3 per 1000 deliveries. Similar and high perinatal mortality rates have been reported in other studies (Herrera *et al*, 2011, Russo *et al*, 2018). Late presentation to the hospital due to poverty, delayed decision taking by the care givers, delayed referral, poor transport network and lack of ambulance system may have resulted in these high rates. This however contrasts a study in the Netherlands where there was no maternal death following uterine rupture with over 90% of the fetuses surviving (Nahum GG and Qaynh, 2018). This third-level delay could contribute to increased maternal and perinatal morbidity and mortality though this was not statistically significant (P 1.00) This study revealed no significant relationship between age, parity, use of oxytocics, and site of rupture, type of treatment and maternal outcome as  $P > 0.05$ .

## **CONCLUSION**

The magnitude of uterine rupture in this study was high, as in many other studies from low and middle-income countries. This trend, if not checkmated, will jeopardize the realisation of the first target of the third sustainable development goal, which tends to reduce the global maternal mortality ratio to less than 70 per 100,000 live births by 2030. The risk factors for uterine rupture identified in this study are largely preventable. Women empowerment, health education, strengthening of primary, secondary and even tertiary health services, including capacity building, to deliver emergency obstetric and newborn care, reduction in primary caesarean section rates, and appropriate and effective antenatal care will reduce if not eliminate the occurrence of uterine rupture. Prompt diagnosis and management will further reduce the maternal and perinatal morbidity and mortality associated with uterine rupture.

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Nil

## **COMPETING INTEREST**

The Authors declare that they have no competing interest.

## **ETHICAL APPROVAL AND CONSENT TO PARTICIPATE**

Ethical approval was sought for from the institution Research and Ethics Committee of the Hospital with ethical approval number as follows; HRER/FTH/BK/273/23. And a written consent to participate in the study was obtained from each study participant before enrolled into the study and the consent form is kept in a retrievable form. No photograph, video or voice of any of the study participants included in the manuscript, neither an under aged child included in the study.

## **AVAILABILITY OF DATA AND MATERIALS**

Data obtained is available in both hardcopy and retrievable electronic form, and made secured.

## **AUTHOR'S CONTRIBUTIONS**

Each partake in the study, from the conceptualization of the research topic to the development of the final manuscript. I U A and O G O conceptualize the research topic and developed the initial draft/proposal for the research, O R O, A Z and S M M jointly developed the questionnaire and consent form, administered the questionnaire and entered the data into the SPSS software while L A A, I U A, and O G O jointly analyzed the data, discussed and developed the final manuscript. All Authors read and approved the final manuscript.

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