



# A 10-Year Retrospective Analysis of Uterine Rupture in a University Teaching Hospital in Nnewi, Nigeria

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## Research Article

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## Abstract

**Background:** One of the most serious obstetric emergencies that seriously endanger both mother and fetus and dramatically increase maternal and perinatal mortality in our community is uterine rupture. The aim of the study is to ascertain the prevalence of uterine rupture and the various aetiologies/predisposing factors associated with it.

**Methods:** From January 1, 2007, to December 31, 2016, patients with ruptured uteruses were studied retrospectively and cross-sectionally at the Nnamdi Azikiwe University Teaching Hospital in Nnewi, Nigeria. Outcome measures included prevalence rate, surgical choices, maternal and fetal outcomes, and maternal case fatality rate. Stata 13.0 (StataCorp LP, Texas, USA) was used to analyze the data.

**Results:** There were 10,777 deliveries and a total of 66 cases of ruptured uterus were treated, giving a ratio of 1 in 163 deliveries or prevalence of 6.0/1000 deliveries. Sixty four case notes were retrieved giving retrieval rate of 97.0% and prolonged obstructed labour was the commonest aetiologic factor identified (42.2%). Other associated factors were grand multiparity (36.0%), previous caesarean section (28.1%), previous myomectomy (3.1%), injudicious use of oxytocin (25.0%), use of misoprostol (3.1%) and abnormal lie (17.2%). Twenty of the patients (31.3%) had repair of the ruptured uterus alone, and 28(43.8%) had repair with bilateral tubal ligation. Six of the patients (9.4%) had total abdominal hysterectomies while 10(15.6%) had sub-total hysterectomies. There were a total of 4 maternal deaths giving a case fatality rate of 6.3%. The fetal outcome was poor with only 11 (17.2%) survivors.

**Conclusion:** Only 17.2% of surviving fetuses had a good result, and 6.1 per 1000 deliveries involved uterine rupture. The rupture of gravid uterus will be decreased, if not completely eliminated, by adequate health education, widespread availability of comprehensive obstetric care facilities, enhanced antenatal care, a decline in the prevalence of primary caesarean sections, and population empowerment of women.

**Keywords:** Uterus; Uterine Rupture; Labour; Antenatal; Pregnancy; Gravid

**Abbreviations:** MMR: Maternal Mortality Ratio; TAH: Total Abdominal Hysterectomies; NAUTH: Nnamdi Azikiwe University Teaching Hospital.

## Introduction

The nonsurgical total disruption of all uterine layers is referred to as uterine rupture [1,2]. One of the most serious obstetric emergencies, uterine rupture puts both mother and fetus in grave danger and is a major factor in our community's high rates of maternal and perinatal mortality [1]. According to the predominant aetiological factors in these regions, the incidence of ruptured uterus differs from country to country. In the previous two decades, reports from various writers in Nigeria and other African countries have placed the frequency between 2.4 and 8.9 per 1,000 deliveries [3]. The frequencies in high-income nations, however, were between 0.22 and 0.04 per 1,000 deliveries [4].

The prevalence of uterine rupture is still high and rising in Nigeria as a result of the country's inadequate administration, poverty, illiteracy, lack of personnel, poor supply of medical drugs and equipment, and lack of manpower [5]. In Ile Ife and Benin, respectively, rates of 1 in 273 deliveries and 1 in 426 deliveries were observed [6,7], while in Zaria and Kano, Nigeria, rates of 1 in 167 deliveries and 1 in 594 deliveries were reported, respectively [8,9].

Obstructed labour, high parity, uterine hyperstimulation with oxytocics, a history of uterine scarring, and intrauterine manipulation, such as external cephalic version, internal podalic version, breech extraction, and manual removal of retained placenta [2,6,8,10], are risk factors for ruptured uterus. Low socioeconomic status, unbooked status, and surgical vaginal deliveries are additional risk factors [7,11-13]. The location, type, and timing of the uterine rupture, the volume of blood lost, and the presence of other concomitant problems all affect how the uterus presents clinically. Therefore, it is necessary to keep a level of suspicion high [14].

Uterine rupture can be treated with hysterectomy, bilateral tubal ligation, or repair alone. As a result, several of the patients lost their ability to reproduce and/or menstruate. Therefore, a ruptured uterus has serious sociocultural ramifications, particularly in a culture where these activities are seen as the very core of womanhood [6].

The main causes of death in uterine rupture include shock (haemorrhagic or septicemic), disseminated intravascular coagulation, acute renal failure, and severe sepsis. Uterine rupture is a substantial cause of maternal mortality [6,8,14].

A ruptured uterus is characterized by a high perinatal death rate, with documented rates ranging from 75 to 93% [15].

The objectives of this study are to ascertain the frequency of uterine rupture at Nnamdi Azikiwe University Teaching Hospital Nnewi between 2007 and 2016 and to identify the various aetiological/predisposing factors, evaluate the management options and patient outcomes, and suggest strategies to prevent uterine rupture and enhance patient outcomes in the hospital.

## Materials and Methods

### Study Design

This is a retrospective cross-sectional analytical study.

### Study Site and Duration

Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Nigeria from 1 st January 2007 to 31st December 2016.

### Study Population

Patients with ruptured uterus managed at NAUTH, Nnewi, Nigeria.

### Inclusion Criteria

Pregnant women with uterine rupture, in our labor ward or referred to us, between 1st January 2007 and 31st December 2016.

### Exclusion Criteria

We excluded women with abruption placentae. The cases of missing or incomplete data were also excluded from the study.

### Sample Size Determination

The sample size was an all population based study.

### Sample Technique

Non-random sampling approach. All available case files were examined.

### Study Outcome Measures

Prevalence rate, surgical treatment options, maternal outcomes and fetal outcomes and maternal case fatality rate.

## Study Procedure

Information concerning patients with ruptured uterus was obtained from the labour ward emergency registers and theatre registers. The case files were retrieved from the medical records library. Information on the booking status, age, parity, place of initial intrapartum care, aetiology, maternal and fetal outcomes, and other relevant information were extracted.

## Definition of Terms

The maternal mortality ratio (MMR) is defined as the number of maternal deaths in a given time period divided by the number of live births (per 100 000 live births) during the same period: MMR is considered to be high if it is greater than or equal to 300 maternal deaths per 100 000 live births and extremely high if it is greater than or equal to 1000 maternal deaths per 100 000 live births; low MMR defined as 20-99 maternal deaths per 100 000 live births, moderate MMR defined as 100-299 maternal deaths per 100 000 live births [16,17]. Maternal deaths due to uterine rupture in maternal case fatality case [16,17].

## Data Analysis

The data obtained was analysed using stata, version 13.0 (StataCorp LP, Texas USA). Mean, mode and standard deviation were employed where applicable and results were presented in tables and chart. Chi-square and Fischer exact test were used to perform statistical comparison. Level of significance was accepted when the P-value is less than 0.05.

## Ethics Approval

The present study was approved by the hospital's ethics Committee (No. 0159/10/2022). Informed consent was waived, because the present study is based on retrospective collection of data.

## Results

During the period under review, there were 10777 deliveries and a total of 66 cases of ruptured uterus were treated, giving a ratio of 1 in 163 deliveries or 6.0 in 1000 deliveries. Of the 66 cases, 64 case folders were retrieved and used for the analysis giving retrieval rate of 97 %.

Table 1 shows the patients profile; age, parity and booking status. The ages ranged between 18-43 years with a mean age of 32.2 years similar to modal age of 32.5years. The highest incidence (40.6%) was in the 31-35 year age group. The parity status of the participants was shown in Table 2.

Age Range	Percent	Cum.
<= 20	3.13	3.13
21-25	3.13	6.25
26-30	26.56	32.02,
31-35	40.63	73.44
36-40	25	38.44
41-45	1.56	100
Total	100	

**Table 1:** Age Characteristics.

The range of parity was 1-7, the modal parity is 5, with lower quartile and upper quartile being 4 and 5 respectively.

Women Parity	Frequency	Precent	Cum.
1-2	4	6.25	6.25
3-4	19	25.69	35.54
para 5 or more	41	64.06	100.00
Total	64	100.00	

**Table 2:** Parity.

Tables 3 shows the booking status of the patients. The analysis of the booking status showed that majority of the patients, 54.7% were unbooked and 29 (45.3%) were booked in NAUTH, Nnewi.

Booking Status	Frequency	Percent	Cum.
booked	23	45.31	45.3
'unbooked	35	54.69	100
Total	64	100	

**Table 3:** Booking Status.

Risk Factors for Rupture	Frequency	Percent	Cum.
abnormal presentation	5	7.81	7.81
injicious use of oxytocin	17	26.54	34.4
misoprostol	2	3.13	37.5
myomectomy	2	3.13	40.6
obstructed labour	19	29.69	70.3
previous caesarean section	19	29.69	100.00
Total	64	100.00	

**Table 4:** Associated Risk Factors of Uterine Rupture.

Table 4 shows the predisposing/aetiological factors identified in these patients. In most of the patients, there were multiple aetiologies present. Obstructed labour was one of the commonest risk factor identified (29.7%). Abnormal presentation (7.8%), previous caesarean section (29.7), previous myomectomy (3.1%) injudicious use of oxytocin (26.6%) and use of misoprostol (3.1%).

Table 5 shows the site of rupture. The most common site of rupture was the lower segment of the uterus in 44 patients (68.8%) followed by the posterior wall in 9 patients (14.1%), and upper segment in 4 patients (6.2%). Seven patients (10.9%) had rupture of both the anterior and posterior walls of the uterus.

Site of Uterine Rupture	Frequency	Percent	Cum.
anterior and posterior wall	7	10.94	10.94
anterior lower segment	44	60.75	79.69
anterior upper segment	4	6.25	85.94
posterior wall	9	14.06	100.00
Total	64	100.00	

**Table 5:** Site of Uterine Rupture.

Table 6 shows the places of intrapartum care. The majority were in various referral centres (85.9%). Only 9 patients (14.1%) started intrapartum care in NAUTH ab initio.

place of Intrapartum	Frequency	Percent	cum.
nauth	9	14.06	14.06
referred	55	55.94	100.00
Total	64	100.00	

**Table 6:** Place of Intrapartum Care.

Surgery	Frequency	Percent	Cum.
only repair	20	31.25	31.25
repair+BTL	28	43.75	75.00
subtotal hysterectomy	10	15.63	90.63
total abdominal hysterectomy	6	9.37	100.00
Total	64	100.00	

**Table 7:** Surgical Management Options of Uterine Rupture.

Table 7 shows the surgical management. In the surgical management of these patients, 20(31.3%) had repair of the ruptured uterus, 28(43.8%) had repair with bilateral tubal ligation. Hysterectomy was performed in 16 patients out of

whom 6(9.4%) had total abdominal hysterectomies (TAH) and 10(15.6%) sub-total hysterectomies.

Table 8 shows the maternal and fetal outcome. There were a total of 6 maternal deaths giving a case fatality rate of 9.4%. Four of the patients were unbooked while two were booked. The causes of maternal death were haemorrhagic shock, septicaemia and disseminated intravascular coagulation.

Maternal Outcome	Frequency	Percent	Cum.
alive	58	90.63	90.63
dead	6	9.38	100.00
Total	64	100.00	

**Table 8:** Maternal Outcome of Uterine Rupture.

Table 9 shows the fetal outcome of uterine rupture. The fetal outcome was poor with only 11 (17.2%) survivors.

Foetal Outcome	Frequency	Percent	Cum.
alive	11	17.19	17.19
dead	53	82.81	100.00
Total	64	100.00	

**Table 9:** Fetal Outcome of Uterine Rupture.

Table 10 shows the relationship between the surgery for uterine rupture and parity of the patients. The type surgery done is largely determined by the woman's parity.

Parity	Surgery				Total
	Only repair	Repair +BTL	Sub Total	Total	
1	1	0	0	0	1
2	2	1	0	0	3
3	5	1	0	1	7
4	7	1	3	1	12
5	5	16	5	3	29
6	0	5	2	1	5
7	0	4	0	0	4
Total	20	28	10	6	64

**Table 10:** The Relationship between Surgery for Uterine Rupture and Parity.

## Discussion

In this study, there were 6.1 uterine ruptures per 1000 deliveries. This number is comparable to the prevalent

reported in the majority of Nigerian centers [3, 6, 11, 12]. Higher numbers were likewise noted in research carried out in other Nigerian centers [8]. This upward trend could be explained by the gradual reduction in the socioeconomic standing of Nigerians in general and women in particular during the course of the study, as well as the rising expense of healthcare in the majority of the nation's tertiary institutions. Unbooked women or clinic defaulters are becoming more prevalent among those who have been booked as a result of the fall in the Nigerian economy [18].

In this study, there were a significant number of unbooked patients (54.7%), which was also the case in related studies [7-9]. This is most likely a result of the country's pervasive poverty and the cost of hospital care in general. No comprehensive health insurance program exists. Patients are only brought to the medical facility as a last resort due to the high cost of attendance [17]. Another issue can be Nigerian women's sociocultural resistance to having an abdominal delivery or recurrent surgery. Thus, many of them would attempt vaginal birth elsewhere only to arrive at the hospital too late due to difficulties that may have been prevented. This was observed in this study where majority of the patients with previous scars who had uterine rupture were either unbooked or booked elsewhere. Studies done in other centres have also confirmed this finding [3,14].

As this study showed, a number of uterine rupture instances were linked to certain risk variables. However, protracted obstructed labour was the most common aetiological cause, followed by inappropriate oxytocin administration and prior surgery. This result is consistent with the bulk of studies conducted in Nigeria [3,6, 8,11]. The results of Igwegbe, et al. and Mbamara, et al. however, showed that traumatic (iatrogenic) rupture was the most prevalent risk factor [5,17]. Another well-known significant aetiological risk for uterine ruptures is increasing parity. Grandmultiparas are particularly vulnerable and represent a significant risk group [19,20].

Grandmultiparas made up 64% of the individuals in this study that experienced uterine rupture. This number is consistent with the results of other comparable studies [14,17,21,22]. Promoting the adoption of contemporary family planning techniques can help lower the prevalence of grandmultiparity and, ultimately, lower the risk of uterine rupture in grand multipara [17]. In order to prevent the rising rate of caesarean sections, it is imperative to take steps to properly advise women who have had caesarean sections, as well as their families, before being allowed to leave the hospital. If the increased number of caesarean sections is not stopped, it will undoubtedly have an impact on the rates of uterine rupture, morbidly adherent placentas, and maternal mortality [17].

In this study, many of the patients were either referred from primary health care facilities, clinics, or hospitals, or they were brought in by family members from their homes. Most women experienced extended labour, but this was either ignored or recognized and incorrectly treated by giving them colossal quantities of oxytocin.

The location and kind of the rupture, the time at which the patient presents to the hospital, the volume of blood lost, and the presence of additional related issues all affect how the patient presents clinically with a ruptured uterus [19]. The most frequent initial presenting symptoms in this study were abdominal discomfort, vaginal haemorrhage, pallor, and shock. In contrast to Eleje's findings, which showed that fetal heart rate anomalies were the most frequent clinical presentation, these results are similar to those of Igwegbe, et al. and Ahmed, et al. [11].

The place and extent of the rupture, the patient's health at the time of presentation, the patient's parity, the surgeon's preference and experience, as well as the sociocultural peculiarities of the practicing areas, all play a role in determining the surgery to be performed [14, 15, 17]. Repair with bilateral tubal ligation was the most often used surgical procedure in this study, followed by uterus-only repair. The least frequent was hysterectomy. The majority of studies conducted in Nigeria show this pattern. However, in certain studies the most prevalent kind of surgery was repair alone [3, 14, 15]. Only young women and those with modest parities who had ruptures in the anterior lower segment, were amenable to sufficient repair, and were free of infection were given the option of repair. Grandmultiparous patients or those with posterior or more extensive ruptures in a bad clinical state underwent repair with tubal ligation. For women who had both anterior and posterior ruptures, hysterectomy was performed. The majority of these patients had uterine arteries or their branches involved, a laceration into the wide ligament, and significant and occasionally uncontrollable haemorrhage. These hysterectomies' indications are comparable to those from earlier studies [3,15,19].

One of the top five causes of maternal deaths in low- and middle-income nations, uterine rupture continues to be a prominent factor in maternal mortality. Four maternal fatalities (6.3%) were noted. This prevalence is lower than that reported by other authors [6, 9, 12, 16], but similar to those of Igwegbe et al [5] and Mbamara et al.[17]. The earlier diagnosis and the quick and forceful surgical intervention are likely to blame for the lower death numbers found in this study. Increased maternal and fetal morbidity and death is strongly correlated with post-diagnosis surgical intervention delay, which is a significant cause. In this study, there was an hour and a half on average between diagnosis and



intervention. A uterine rupture is frequently linked to a poor fetal outcome. Although extremely high in our study (82.8%), the results of other studies were comparable [14-16].

The current study provides the most recent data on the prevalence, mortality, and risk factors for uterine rupture in the study hospital, a referral center, despite the fact that the data period extends back to 2016. The current analysis has a number of drawbacks. As only cases seen in the tertiary hospital were reported in this study, there may first be an underreporting of uterine rupture cases and deaths. Second, due to some missing data, prevalence and mortality may have been overestimated. Thirdly, there was a dearth of analysis regarding the patterns of mortality and prevalence among the various uterine rupture subgroups. This information has some significance for the management and prevention of uterine rupture because the prevalence, mortality, risk factors, and epidemiologic trends may alter depending on parity, age, and the number of live children [22].

In conclusion, there were 6.1 uterine ruptures for every 1000 deliveries, and only 17.2% of the fetuses survived. First, increasing access to health care facilities and ensuring that everyone has health insurance can help reverse this trend. This will also lower the number of unbooked cases and uterine ruptures. Second, through retraining and education programs, private hospitals and basic health centers should be encouraged to refer high-risk pregnancies early in labour or during the prenatal period. Thirdly, measures must be taken to lower the caesarean section rate, which is on the rise. Finally, there is a need to increase access to antenatal care by providing community based essential obstetric care backed by emergency obstetrics care in comprehensive health facilities.

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### Author Contributions

All the authors were involved in the overall conceptual design and implementation of the project, and overall revision of the manuscript. CBO, OCO, CGO, JCN, and COE contributed to data collection, analysis, and manuscript writing. BUO, GUE, SON, EAE, CCO, IJO, MCE, JEM, UCC, and NLO were involved in the writing of this manuscript and overall revision. The authors read, approved the final manuscript, and agreed to be accountable for all aspects of the work.

### Disclosure Statement for Publication

All authors have made substantial contributions to conception and design of the study, or acquisition of data, or analysis and interpretation of data; drafting the article or revising it critically for important intellectual content; and final approval of the version submitted. This manuscript has not been submitted for publication in another journal.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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### Ethical Approval and Consent to Participate

The study was approved by the Ethics Review Board of the hospital (Reference number: 0159/10/2022; date of approval: 26th October, 2022). Informed consent was not sought for the present study because it was a retrospective study of cases. The waiver for the consent was taken from the Institutional Review Board.

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