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*Research Article*

# Review of Maternal and Fetal Mortality Associated with Uterine Rupture at a Tertiary Maternity Center in Lagos, Nigeria

**Oba F.O[1], Okunade K.S[1,2], Ojo T[3] and Moses O.E[4]**

[1]*Department of Obstetrics & Gynaecology, Lagos University Teaching Hospital, Ikeja. Lagos, Nigeria*
[2]*Department of Obstetrics & Gynaecology, College of Medicine, University of Lagos. Lagos, Nigeria*
[3]*Department of Obstetrics & Gynaecology, Federal Medical Center, Ebute-Meta. Lagos, Nigeria*
[4]*Department of Obstetrics & Gynaecology, Lagos Island Maternity Hospital. Lagos, Nigeria*

**ABSTRACT**

More than 90% of maternal deaths and stillbirths occur in developing countries, and ruptured uterus is a major contributor. This study was aimed to review the current incidence of uterine rupture and the associated maternal and fetal mortality in Lagos, Nigeria over a 13-year period. This was a descriptive retrospective review of all cases of uterine rupture at a tertiary maternity center in Lagos, Nigeria over a 13-year period. The case notes of all women were retrieved from the Medical records Department and relevant information extracted. Descriptive statistics were computed for all quantitative data and statistical analysis was done using Epi info version 7.2 statistical packages for windows. A total of 18,188 deliveries were conducted during the review period and out of which 91 cases of uterine rupture occurred giving an incidence of 5.0 per 1,000 deliveries. Maternal and fetal deaths were recorded in 6.6% and 73.6% of cases. Most of the cases of uterine rupture in this study (51.7%) were treated by uterine repair with or without bilateral tubal ligation. Uterine rupture still remains a common problem in Nigeria and is associated with severe maternal and perinatal mortality. Effective measures to reducing the high maternal and perinatal mortality associated with uterine rupture should include health education of the masses, proper antenatal care, early referral of at-risk patients, and increased access to supervised hospital delivery

**Keywords:** *Caesarean section, Incidence, Multiparous, Stillbirths*

*Author for correspondence: *E-mail*: *kehindeokunade@gmail.com*

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## INTRODUCTION

Globally, maternal deaths and stillbirths have continued to rise unabated, with total annual figures of about 529,000 and 3.3 million, respectively (Gyamfi-Bannerman *et al* 2012 and Kadowa 2010). More than 90% of these occur in developing countries, and ruptured uterus is a major contributor, having accounted for more than 31.9% of maternal and 96.3% of perinatal deaths, as reported in a study from south-western Nigeria (Ezechi *et al* 2004).

Ruptured uterus is one of the major causes of maternal morbidity and mortality especially in the developing part of the world. It is a grave obstetric condition which is almost always fatal for the fetus (Kulkami *et al* 1997). Uterine rupture typically is classified as either complete (all layers of the uterine wall separated) or incomplete (uterine muscle separated but visceral peritoneum is intact). Incomplete rupture is also commonly referred to as uterine dehiscence. As expected, morbidity and mortality are appreciably greater when uterine rupture is complete. Currently, the greatest risk factor for either complete or incomplete uterine rupture is prior caesarean delivery (Smith 1975 and Nagarkatti *et al* 1991).

The reported incidences of uterine rupture vary in different countries and institutions. The reported incidence at the Lagos University Teaching Hospital in 1998 by Ola *et al* was 5.01 per 1000 deliveries with unbooked patients accounting for over 80% of cases (Ola *et al* 1998). An incidence of 2.4 per 1000 deliveries had also been reported from Accra, Ghana (Adanu *et al* 2003). Ruptured uterus is associated with high maternal and perinatal mortality. At the Lagos University Teaching Hospital, it accounted for 16.9%

of maternal deaths and 86.3% of perinatal mortality between January 1985 and December 1992 (Ola *et al* 1998). Fetal morbidity invariably occurs following uterine rupture due to the catastrophic hemorrhage, fetal anoxia, or both. However, the chief causes of maternal and perinatal deaths are usually hemorrhage, shock and sepsis which underline the importance of adequate fluid resuscitation, availability of blood and blood products, and effective antibiotics.

There has been an increase in the number of secondary healthcare facilities and improvement in the capacities of the existing tertiary institutions in Lagos State. This is coupled with the availability of supportive care necessary for the management of uterine rupture since the previous studies were carried out in the 1990s thus necessitating the need for the currently existing data. This present study was therefore aimed to review the incidence of uterine rupture and the associated maternal and fetal mortality in Lagos, Nigeria over a 13-year period.

## MATERIALS AND METHODS

This was a descriptive retrospective review of all cases of uterine rupture that occurred over a 13-year period (from January 1, 2000 to December 31, 2012) at the Lagos Island Maternity Hospital (LIMH), Lagos, Nigeria. LIMH is an over 200 bedded tertiary maternity hospital located in the Central Lagos metropolis in South-West Nigeria. It provides services to patients from the neighbouring South-Western states. The hospital is the largest maternity center in the state and offers mainly clinical services among which include prenatal, intrapartum and postnatal care.

Ethical approval for the study was obtained from the Hospital's Health Research and Ethical Review Board prior to the commencement of the study. Ethical principles according to the Helsinki Declaration were considered throughout the course of the study.

The case notes of all women who had uterine rupture and were managed in the hospital during the period of review were retrieved from the Medical records Department. Information on the socio-demographic characteristics, booking status, characteristics of the uterine rupture, associated maternal/fetal deaths and the surgical treatment modalities offered were extracted. Descriptive statistics were computed for all quantitative data and statistical analysis was done using Epi info version 7.2 statistical packages for windows manufactured by the US Centre for Diseases Control and Prevention

## RESULTS

A total of 18,188 deliveries were conducted in the hospital during the reviewed period and out of which 91 cases of uterine rupture occur giving an overall incidence of 5.0 per 1,000 deliveries. The annual incidence of uterine rupture from the year 2001 through 2012 ranged from 2.0 to 8.2 per 1,000 deliveries. The peak incidence of 8.2 per 1,000 deliveries was recorded in the year 2000 (Figure 1).

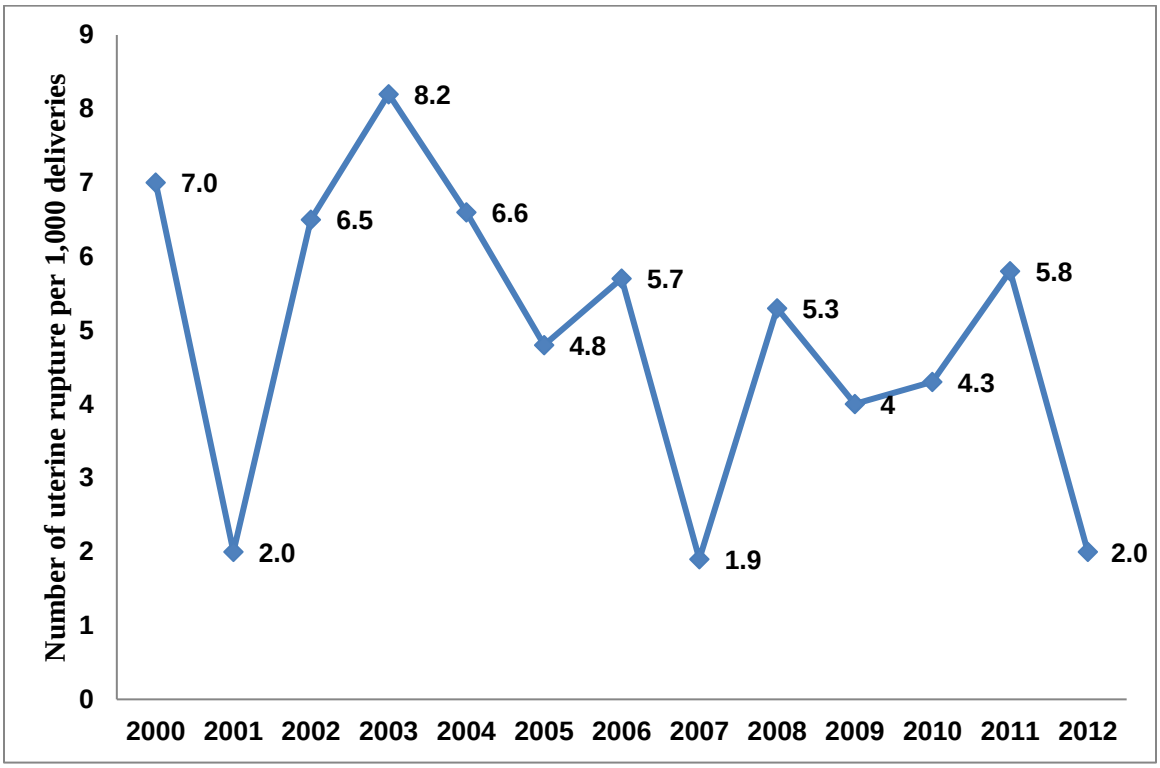


**Figure 1:**
Yearly trends in the incidence of Uterine Rupture (2000 to 2012)

As shown in Table 1, the age range of the women was 19 to 42 years, and the mean age was 30.8±4.3 years. The peak age of the women in the study was 30-34 years (40.7%) and the majority of them (63.70%) were multiparous. Up to 87 of the 91 women (95.6%) were unbooked without any previous antenatal care in our hospital. A major proportion of the women (87.9%) had complete uterine rupture while the remaining 12.1% had partial uterine rupture diagnosed during caesarean section (Table 2). Only 26 (28.6%) of the women has had previous caesarean section. A larger proportion of the women (97.8%) had uterine rupture following obstetric interventions in labour while only 2 cases (2.2%) of spontaneous uterine rupture were reported.

**Table 1:**
Baseline characteristics of women who had uterine rupture (n=91)

| Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age (in years)** | | |
| <25 | 4 | 4.4 |
| 25-29 | 30 | 33.0 |
| 30-34 | 37 | 40.7 |
| 35-39 | 17 | 18.7 |
| ≥40 | 3 | 3.3 |
| Mean ± SD = 30.8 ± 4.3 years | Age Range = 19-42 years | |
| **Parity** | | |
| 0 | 5 | 5.5 |
| 1 | 28 | 30.8 |
| ≥2 | 58 | 63.7 |
| **Booking status** | | |
| Booked | 4 | 4.4 |
| Unbooked | 87 | 95.6 |

**Table 2:**
Characteristics of the uterine rupture (n=91)

| Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| **Types of uterine rupture** | | |
| Complete | 80 | 87.9 |
| Incomplete | 11 | 12.1 |
| **Previous history of caesarean section** | | |
| Yes | 26 | 28.6 |
| No | 65 | 71.4 |
| **Associated event** | | |
| Traumatic | 89 | 97.8 |
| Spontaneous | 2 | 2.2 |

On review of the associated maternal and perinatal complications in the study (Table 3), a large proportion of the women (84.6%) had massive obstetrics haemorrhage in association with the uterine rupture while maternal deaths were recorded in only 6 (6.6%) of the cases. Sixty-seven (73.6%) fetal deaths were reported during the period of review. All the women in the study had surgical interventions and as shown in Table 4, majority of the women had subtotal hysterectomies as their chosen treatment modality. Most of the cases of uterine rupture in this study (51.7%) were treated by uterine repair with or without bilateral tubal ligation

**Table 3:**
Associated maternal and fetal complications (n=91)

| Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| **Maternal blood loss (in mL)** | | |
| <1,500 | 14 | 15.4 |
| ≥1,500 | 77 | 84.6 |
| **Maternal death** | | |
| Yes | 6 | 6.6 |
| No | 85 | 93.4 |
| **Fetal death** | | |
| Yes | 67 | 73.6 |
| No | 24 | 26.4 |

**Table 4:**
Types of treatment offered at surgery (n=91)

| Type | Frequency | Percentage |
|---|---|---|
| Uterine repair only | 26 | 29.2 |
| Uterine repair + BTL | 20 | 22.5 |
| Total hysterectomy | 6 | 6.7 |
| Subtotal hysterectomy | 37 | 41.6 |

[#] BTL – Bilateral Tubal Ligation

## DISCUSSION

The incidence of ruptured uterus in this study (5.0 per 1,000 deliveries) is within the reported incidence range of 3.9 and 5.4 per 1,000 deliveries from previous Nigerian studies conducted in Rivers (Nyengidiki *et al* 2011) and Lagos State (Ola *et al* 1998 and Fabamwo *et al* 2008) respectively. It is also totally similar to the incidence of 5.0 in 1,000 deliveries reported by Kadowa in rural Uganda in 2010 (Kadowa 2010) but much higher than 0.2, 1.3 and 2.2 per 1,000 deliveries obtained from Singapore (Chen *et al* 1995), India (Saritha *et al* 2015) and Bahrain (Al-Jufairi *et al* 2001) respectively. The similarities in the overall incident rates of uterine in this study and that of other previous Nigerian studies probably suggest

that the presence of many predisposing factors such as ignorance, poverty, negative culture and values, and government's lack of interest in providing quality healthcare for its citizenry still remain persistently high in our society and thus have an enormous effect on the various health indices in the country despite the perceived improvement in infrastructural provision. However, the trend towards reduction in incidence from 5.8 to 2.0 per 1,000 deliveries between year 2011 and 2012 probably coincided with the period of massive upgrading of many general hospitals in various locations in Lagos State to first class maternity centers by the State government.

Our study showed that women that were largely affected by this major obstetric catastrophic were those between 30-34 years of age. This study was similar to the reported finding by Ezechi *et al* in Lagos (Ezechi *et al* 2004) but in contrast to the study from Port Harcourt (Nyengidiki *et al* 2011) where a peak age incidence of 25-29 years was reported. The possible explanation for this is the culturally acceptable earlier age of marriage in the South-southern part of the country compared to the South-western part where this current study was conducted. The lower peak age incidences of uterine rupture occurrences in the 20s as reported by studies conducted in other developing countries of the world (Kadowa 2010 and Saritha *et al* 2015) may be an indicator of the unique socio-cultural barriers faced by these young women in accessing skilled care. It also supported the increased tendency of women in this age group to developing cephalopelvic disproportion and obstructed labour which are major predisposing factors to uterine rupture.

Previous studies (Kadowa 2010, Kulkami *et al* 1997, Chen *et al* 1995, Saritha *et al* 2015 and Schrinsky *et al* 1978) have reported that most of the women who had uterine rupture were multiparous and this current study also corroborated this finding as 63.7% of the women had parity of 2 and above. A study conducted by Al-Jufairi *et al* in Bahrain did not find any association between increasing parity and uterine rupture (Al-Jufairi *et al* 2001). We reported that majority of the women (95.6%) in this study were unbooked in similarity with previous studies carried out within Nigeria and other African countries (Kadowa 2010, Ola *et al* 1998, Nyengidiki *et al* 2011, Saritha *et al* 2015 and Konje *et al* 1990). The unbooked nature of most women in this study was not surprising as the study institution is a referral center surrounded by so many smaller hospitals and healing homes. This may also be a reflection of the overall utilisation of reproductive health services in the developing countries of the world and therefore since the majority of these women did not receive antenatal care, they were more likely to attempt delivery under unskilled hands either in their homes or at the traditional birth attendant's place (Kadowa 2010).

Complete uterine rupture in which the fetus was partially or totally extruded into the peritoneal cavity was observed in most of the cases in our study (87.9%) as well as in other studies (Saritha 2015 and Igwegbe *et al* 2013). A uterine scar from a previous cesarean section (CS) is the most common risk factor for uterine rupture (Smith 1975 and Nadarkatti *et al* 1991). The risk of uterine rupture in labouring women with a previous CS varies between 0.2 and 1.5% after induction of labour, compared to 0.5% in women with spontaneous labour after a previous CS (Nadarkatti *et al* 1991 and Laveriano *et al* 2013). Our study showed that almost one-third of the women who had uterine rupture have had previous CS thus suggesting that a significant number of women with uterine scar due to CS often do not return to the hospital for their subsequent deliveries because of fear of a repeat CS and usually end up in peripheral centers or TBA homes. However, the majority of the women in this study had rupture of the unscarred uterus at home or at TBAs, in similarity with the study by Kadowa (Kadowa 2010) but in contrast to the report from Singapore by Chen *et al*, in which over two-thirds of the cases occurred in women with a scarred uterus (Chen *et al* 1995). This shows the severity of obstructed labour and the possible delay in accessing qualified care by the women in this review. We reported 2 cases (2.2%) of spontaneous uterine rupture not preceded by labour or traumatic event. No apparent cause was found in these women apart from multiparity. The possibility of this occurrence was emphasized in a case report by Guèye *et al* (Guèye *et al* 2012) and in a series of 40 uterine ruptures by Schrinsky and Benson (Schrinsky *et al* 1978) where they found ten spontaneous ruptures without any predisposing factors.

A significant number of the women in our study (84.6%) had massive obstetric haemorrhage with an estimated blood loss of greater than 1.5 Liters. This is similar to the finding by Cowen *et al* who found a mean blood loss of at least 1,500 in 60% of women who developed uterine rupture (Cowan *et al* 1994). The high number of patients who had massive obstetric haemorrhage in this study is a reflection of the various delays that women in this part of the world experience usually before having access to effective health care interventions in our institutions.

Uterine rupture is associated with significant morbidity and mortality. Maternal death as a consequence of uterine rupture occurs at a rate of 0-1% in modern developed nations, but the mortality rates in developing countries are 5-10% (Gregory *et al* 1999). Our study which was conducted in Nigeria, a developing country, equally recorded maternal deaths in 6.6% of the cases reviewed. This is comparable to the rates of 8.5% and 8% reported from South African (Mokgokong *et al* 1976) and Uganda (Kadowa 2010) respectively but much lower than the 17.5% mortality reported from Port Harcourt (Nyengidiki *et al* 2011). However, our finding is in sharp contrast to a study from Los Angeles in which Leung *et al* reported only 1 death among 99 women with uterine rupture (Leung *et al* 1993). The non-availability of modern medical facilities and inadequate skilled healthcare providers in developing countries is likely to account for this wide variation in maternal outcomes between developing and developed countries. Fetal mortality almost invariably occurs following uterine rupture due to the catastrophic hemorrhage, fetal anoxia, or both. The fetal death rate in this study was 73.6% and this is similar to result obtained from another centre in the country (Nagarkatti *et al* 1991). Schrinsky and Benson (Schrinsky *et al* 1978), in their study, found a fetal mortality rate of 64.6% while Kadowa reported 93% mortality rate in Uganda (Kadowa 2010).

Early surgical intervention is usually the key to successful treatment of uterine rupture (Nagarkatti *et al* 1991). The mode of treatment will be based on the extent of rupture, desire of

the mother, the number of children she has, the decision and experience of the physician on the operating table in theatre (Laveriano *et al* 2013). The therapeutic management in most cases is either total or subtotal hysterectomy. However, uterine repair can be performed (Smith 1975) to preserve the reproductive function of patients who have never given birth but with a recurrence risk of uterine rupture being between 4 and 19% at a subsequent pregnancy (Laveriano *et al* 2013). For this reason, it has been recommended that women with a previous uterine rupture undergo an elective Caesarean delivery as soon as fetal lung maturity can be demonstrated (Schrinsky *et al* 1978). Most of the cases of uterine rupture in this study (51.7%) were treated by uterine repair with or without bilateral tubal ligation in almost similar proportion to the 70% reported in 1998 by Ola and Olamijulo in Lagos [Ola et 1998]. This is most likely because this is the easiest and safest procedure in many cases. Subtotal abdominal hysterectomy was also preferred to total abdominal hysterectomy in the study and this is probably because it is faster and safer for the patient. This study was however hospital-based thus limiting the generalizability of the reported findings to the entire population

In conclusion, the study was able to demonstrate that uterine rupture still remains a common problem in Nigeria and is associated with severe maternal and perinatal mortality. Uterine rupture cuts across the different reproductive age groups and majority of affected patients are multiparous during labour. Effective measures to reducing the high maternal and perinatal mortality associated with uterine rupture should include health education of the masses, proper antenatal care, early referral of at-risk patients, and increased access to supervised hospital delivery.

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