

# Uterine rupture at a secondary hospital in Afikpo, Southeast Nigeria

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## ABSTRACT

**Introduction:** Uterine rupture is an obstetric catastrophe that is associated with high maternal and perinatal mortality rates. Its incidence is high in developing countries. In Nigeria, the incidence of uterine rupture continues to increase due to poverty, illiteracy, ignorance, the lack of quality obstetric care and bad governance.

**Methods:** A retrospective review was conducted of all cases of ruptured uterus seen at the Mater Misericordiae Hospital in Afikpo, Nigeria between January 2001 and December 2007.

**Results:** There were a total of 51 ruptured uteri out of 4,361 deliveries, yielding a ratio of one in 86. A total of 19 (37.3 percent) patients had a scarred uterus, while 32 (62.7 percent) had an intact uterus, yielding a scarred to unscarred uterus ratio of one in 1.7. The mean maternal age was 32.0 years, and the mean parity was 3.4. Patients with a scarred uterus had a lower mean age and parity. 29 (56.9 percent) cases were unbooked, out of which seven (24.1 percent) had a scarred uterus. Obstructed labour (88.2 percent), grand-multiparity (27.5 percent) and abnormal lie (9.8 percent) were the main causes of rupture. 39 (76.5 percent) patients had their labour managed at home or by traditional birth attendants before presentation. 45 (88.2 percent) patients underwent uterine repair alone, five (9.8 percent) had uterine repair with bilateral tubal ligation and one (two percent) had a hysterectomy. Three maternal deaths occurred, yielding a case fatality rate of 5.9 percent. The perinatal mortality rate was 84.6 percent.

**Conclusion:** Health education, the provision of quality obstetric care, improved governance and monitoring of the activities of traditional birth attendants may help to reduce the menace of uterine rupture.

**Keywords:** grandmultiparity, Nigeria, obstructed

labour, scarred uteri, secondary hospital, uterine rupture

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## INTRODUCTION

Uterine rupture is an obstetric catastrophe that is associated with high rates of maternal and perinatal mortality.<sup>(1)</sup> Survivors are often encumbered with morbidities such as severe anaemia, septicaemia, obstetric fistulae and psychological trauma, which makes the recovery process a prolonged and turbulent one.<sup>(2)</sup> Even after recovery, the impaired reproductive functions that result from surgical management predispose patients to marital disharmony.<sup>(1,2)</sup>

The occurrence of uterine rupture varies in different parts of the world.<sup>(1,2)</sup> Its incidence is very low in developed nations, but continues to remain high in developing countries.<sup>(1,2)</sup> In developed nations and countries in transition, such as Singapore, a scarred uterus and oxytocic stimulation of labour are the major causes of uterine rupture.<sup>(1-3)</sup> In developing countries, however, the amalgamation of such factors as ignorance, quackery, the mismanagement of essential medical consumables and bad governance contributes to the high incidence rate and ensures that rupture of the gravid uterus remains a major public health concern.<sup>(1-3)</sup>

In Nigeria, the incidence of uterine rupture has remained high in the last four decades,<sup>(4-10)</sup> and the reported rates are several times higher than those in developed countries and countries in transition.<sup>(2,3,11,12)</sup> The major antecedent factors are poverty, ignorance, illiteracy, traditional practices, high parity, a lack of antenatal care, unsupervised delivery, poor infrastructure, delivery outside of a health institution, cephalopelvic disproportion and the injudicious use of oxytocics.<sup>(4-10,13)</sup> In this decade, while the incidence of uterine rupture has remained very low in developed countries and countries in transition,<sup>(1,2,14)</sup> Nigeria has continued to record high and rising incidence rates.<sup>(1,15-17)</sup> The causes have remained essentially the same,<sup>(4-10,13)</sup> although with the increasing trend toward caesarean deliveries,<sup>(18)</sup> uterine scars have begun to make an increasing and significant contribution to the occurrence of uterine rupture in Nigeria.

This study aimed to appraise the occurrence of

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**Table I. Annual deliveries, ruptured uteri, incidence rates, scarred uteri and caesarean sections.**

Year	No. of deliveries	No. of caesarian sections (%)	No. of ruptured uterus (%); incidence rate	No. of scarred uterus (%)
2001	735	170 (23.1)	9 (1.2); 1:82	3 (33.3)
2002	660	129 (19.5)	6 (0.9); 1:110	2 (33.3)
2003	637	132 (20.7)	5 (0.8); 1:127	2 (40.0)
2004	614	169 (27.5)	13 (2.1); 1:47	7 (53.8)
2005	547	111 (20.3)	3 (0.5); 1:182	0 (0.0)
2006	553	140 (25.3)	7 (1.3); 1:79	3 (42.9)
2007	615	141 (22.9)	8 (1.3); 1:77	2 (25.0)
Total	4,361	992 (22.7)	51 (1.2); 1:86	19 (37.3)

rupture of the gravid uterus at a secondary hospital in Afikpo, southeast Nigeria, over a period of seven years. Patients were grouped into those with an unscarred (intact) uterus and those with a scarred uterus, and the characteristics of these groups were compared. The findings were also compared with those of other studies, and recommendations were made to help curb the incidence of this obstetric catastrophe.

## METHODS

This was a retrospective study of all cases of ruptured uterus managed at the Mater Misericordiae Hospital, a secondary hospital located in Afikpo, southeastern Nigeria, between January 2001 and December 2007. The hospital has facilities for emergency obstetric care and offers 24-hour emergency maternity coverage. Due to its strategic location, it offers obstetric services to patients from the majority of the southeastern states of Nigeria and serves as a referral centre to other smaller facilities within Afikpo and beyond.

Data was collected from labour ward records, theatre registers and patients' case folders using a structured format. Information was obtained on the maternal age, parity, booking status, previous uterine scars, the causes of rupture, surgical management, maternal and foetal outcomes, and the total number of deliveries and caesarean sections. The data was analysed using simple percentages, and inferential statistics were obtained using the Statistical Package for the Social Sciences version 15.0 for Windows (SPSS Inc, Chicago, IL, USA). Paired sample *t*-tests were used to test the statistical significance, where applicable, at  $p < 0.05$  and 95% confidence interval (CI). The results were then compared with the findings of other studies. This study was approved by the hospital's Ethics Committee.

## RESULTS

51 ruptured uteri were reported from 4,361 deliveries, yielding an incidence rate of one in 86 deliveries.

19 (37.3%) patients had a scarred uterus and 32 (62.7%) had an unscarred uterus, yielding a scarred to unscarred uterus ratio of 1:1.7. The scars were all from lower segment caesarean sections: 15 (78.9%) were primary and four (21.1%) were multiple. There were 992 caesarean sections during the study period, which yielded a caesarean section rate of 22.7%. The incidence of rupture in intact uteri was thus one in 105 deliveries and that in scarred uteri was one in 52 lower segment caesarean sections. Table I shows the trends in the annual frequency of deliveries, ruptured uteri, contributions by scarred uteri and caesarean sections. The highest incidence of uterine rupture (one in 47 deliveries, or 2.1%) occurred in 2004 (Fig. 1). This dropped to a nadir of one in 182 (0.6%) deliveries in 2005 and rose to one in 77 (1.3%) deliveries in 2007. Scarred uteri made the highest contribution of 53.8% in 2004. The overall contribution of scarred uteri of 37.3% was higher than the caesarean section rate of 22.7%.

Table II shows the age, parity and booking status of all the patients, as well as specifically, for patients with unscarred and scarred uteri. The overall mean age of the patients was  $32.0 \pm 5.6$  years and the mean parity was  $3.4 \pm 2.1$ . Patients with intact uteri had a wider age range and a higher mean age and parity than those with scarred uteri. The differences between the mean age and parity for these two groups were statistically significant at  $p < 0.05$  and 95% CI in both instances. Women aged 30–34 years old and those who were multiparous were more adversely affected in both groups. 22 (43.1%) of the patients had booked for antenatal care. Of these, 10 (45.5%) had an intact uterus and 12 (54.5%) had a scarred uterus. Likewise, 29 (56.9%) patients were unbooked, out of which 22 (75.9%) had an intact uterus while seven (24.1%) had a scarred uterus. 12 (63.2%) patients with scarred uteri were booked for antenatal care as opposed to 10 (31.2%) with unscarred uteri.

Multiple aetiological factors were identified (Table III). Obstructed labour, which was the commonest

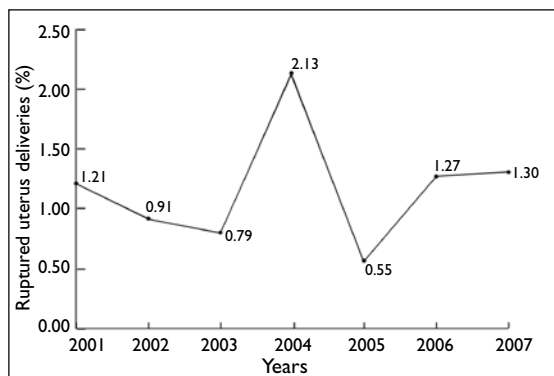


Fig. 1 Trends in the annual incidence of ruptured uterus.

factor, occurred in 45 (88.2%) cases. This was followed by grandmultiparity (27.5%) and abnormal lie (9.8%). The percentage of patients with an unscarred uterus who were affected by obstructed labour (87.5%) was similar to that of patients with a scarred uterus (89.5%). Conversely, grandmultiparity was more common in patients with unscarred uteri (34.4%) than in those with scarred uteri (15.8%). Abnormal lie and a retained second twin occurred almost equally in both groups, whereas oxytocic use was more common in patients with scarred uteri (10.5% vs. 3.1%). One case of a twin pregnancy in a primary caesarean scar ruptured spontaneously at 34 weeks gestation. 39 (76.5%) patients had an attempted delivery at home or with traditional birth attendants (TBAs); 25 (64.1%) of these patients had an unscarred uterus and 14 (35.9%) had a scarred uterus. Three of the patients, two (66.7%) of whom had a scarred uterus, received oxytocin injections for labour stimulation from the supervising TBA. The majority of the cases (45 cases, or 88.2%) had uterine repair alone, 9.8% had uterine repair with bilateral tubal ligation and one (2.0%) had a total abdominal hysterectomy owing to uterine rupture following three previous caesarean scars. Three maternal deaths occurred, thus yielding a case fatality rate of 5.9%. The affected mothers were unbooked, grandmultiparous and had unscarred uteri. Two (66.7%) deaths resulted from hypovolaemia, while one (33.3%) was from septicaemia.

52 babies were involved in the 51 cases of uterine rupture. Of these, 47 (90.4%) were singletons, three (5.8%) were retained second twins and two (3.8%) were a set of twins. The babies had a mean weight of 3.2 ± 1.4 kg (range 1.4–4.7 kg) and a male to female ratio of 1:1. Table IV shows the foetal outcome in uterine rupture. Altogether, 32 (61.5%) babies were delivered by patients with unscarred uteri and 20 (38.5%) by patients with scarred uteri. In all, 44 (84.6%) babies were stillborn. Of these, 29 (69.5%) were delivered by women with unscarred uteri.

Table II. Age, parity and booking status of all the patients with uterine rupture, unscarred uterus and scarred uterus.

Variable	No. (%)		
	All (%)	Unscarred Uterus (%)	Scarred Uterus (%)
<b>Maternal age (yrs)</b>			
< 19	1 (2.0)	1 (3.1)	-
20–24	4 (7.8)	3 (9.4)	1 (5.3)
25–29	8 (15.7)	3 (9.4)	5 (26.3)
30–34	24 (47.1)	15 (46.9)	9 (47.3)
35–39	9 (17.6)	6 (18.7)	3 (15.8)
> 40	5 (9.8)	4 (12.5)	1 (5.3)
Total	51 (100.0)	32 (100.0)	19 (100.0)
Mean age ± SD (yrs)	32.0 ± 5.6	32.3 ± 6.1	31.5 ± 4.7
<b>Parity</b>			
Nulliparae	3 (5.9)	1 (3.1)	2 (10.5)
Primiparae	8 (15.7)	1 (3.1)	7 (36.8)
Multiparae	26 (51.0)	17 (53.1)	9 (47.4)
Grandmultiparae	14 (27.4)	13 (40.6)	1 (5.3)
Total	51 (100.0)	32 (100.0)	19 (100.0)
Mean parity ± SD	3.4 ± 2.1	4.2 ± 2.0	1.9 ± 1.4
<b>Booking status</b>			
Booked	22 (43.1)	10 (31.2)	12 (63.2)
Unbooked	29 (56.9)	22 (68.8)	7 (36.8)

## DISCUSSION

Globally, maternal deaths and stillbirths have continued to rise unabated, with total annual figures of about 529,000 and 3.3 million, respectively.<sup>(19)</sup> 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 southeastern Nigeria.<sup>(17)</sup> The incidence rate of one in 86 deliveries found in this study is significantly higher than that of one in 133 deliveries found in this same centre about two decades ago ( $p < 0.05$  at 95% CI).<sup>(5)</sup> These findings, in addition to those of Ezechi et al<sup>(1)</sup> and other studies from Nigeria,<sup>(4-10,15-17)</sup> show that the incidence of ruptured uterus has been high in our country for decades and continues to rise. These findings are much higher than those reported from Singapore, where Chew has reported an incidence rate of one in 3,869 deliveries,<sup>(12)</sup> and Chen et al have recorded a rate of one in 6,331 deliveries a decade after that.<sup>(3)</sup> This is a drop of approximately 40%. Thus, while the incidence has been falling in Singapore, it has been rising in Nigeria. This is regrettable because, despite global advancements in obstetric care, the same circumstances and factors that caused uterine rupture two to four decades ago in Nigeria are still present today.<sup>(1,4-10,13,15-17)</sup> In addition, as a result of the rising rates of caesarean section in Nigeria,<sup>(18)</sup> scarred uteri are increasingly contributing to the incidence of uterine rupture.<sup>(7-9,15)</sup> Scarred uteri are one of the major

**Table III. Causes of ruptured uterus and surgical management in all patients, patients with unscarred uterus and patients with scarred uterus.**

Item	No. (%)		
	All (n = 51)	Unscarred uterus (n = 32)	Scarred uterus (n = 19)
<b>Cause of rupture</b>			
Obstructed labour	45 (88.2)	28 (87.5)	17 (89.5)
Grandmultiparity	14 (27.5)	11 (34.4)	3 (15.8)
Abnormal lie	5 (9.8)	3 (9.4)	2 (10.5)
Retained second twin	3 (5.9)	2 (6.3)	1 (5.3)
Injudicious use of oxytocic	3 (5.9)	1 (3.1)	2 (10.5)
Breech presentation	1 (2.0)	1 (3.1)	-
Twin pregnancy	1 (2.0)	-	1 (5.3)
Labour outside hospital	39 (76.5)	25 (78.1)	14 (73.7)
<b>Surgical management</b>			
Repair alone	45 (88.2)	29 (90.6)	16 (84.2)
Repair with BTL	5 (9.8)	3 (9.4)	2 (10.5)
Total abdominal hysterectomy	1 (2.0)	-	1 (5.3)
<b>Total</b>	<b>51 (100.0)</b>	<b>32 (100.0)</b>	<b>19 (100.0)</b>

BLT: bilateral tubal ligation

causes of uterine rupture in Singapore,<sup>(3,12)</sup> as well as in other developed countries.<sup>(11)</sup> The fact that 37.3% of our patients had scarred uteri compared to 26.2%, as reported in a study from southwestern Nigeria almost ten years ago,<sup>(1)</sup> is related to the rising caesarean section rates.<sup>(18)</sup> Scarred uteri caused a disproportionate increase in the incidence of uterine rupture in this study, from one in 105 deliveries in intact uteri to an overall one in 86 deliveries. When the scarred to unscarred uteri ratio of 1:1.7 found in our study is compared with the 3:1 ratio found by Chen et al,<sup>(3)</sup> it becomes clear that scarred uterus is a dominant cause of uterine rupture in Singapore. However, a comparison of the actual numbers of ruptured uteri in both countries shows that cases of ruptured uteri from intact and scarred uteri in Nigeria are several hundred times higher than in Singapore. Also, unlike in Singapore, where scars from sections performed abroad and other causes of uterine scars have been documented,<sup>(3,12)</sup> all the uterine scars in our study were from locally performed lower segment caesarean sections. The scar dehiscence rate of one in 52 lower segment caesarean sections found in our study is more than 18 times the rate of one in 940 found by Chew.<sup>(12)</sup>

In terms of the mean age of the patients and the age group found to be the most adversely affected, our findings are similar to other findings from Nigeria<sup>(1,7,15,20)</sup> and Ethiopia,<sup>(2)</sup> which show that women aged 30–34 years are most at risk of uterine rupture in pregnancy. As expected, mothers with a rupture of intact uterus are at a higher mean age and parity than those with scarred uteri. The huge contribution made by high parity to uterine

**Table IV. Foetal outcome following a ruptured uterus.**

Outcome	No. (%)		
	Total	Unscarred uterus	Scarred uterus
Foetus involved	52 (100.0)	32 (61.5)	20 (38.5)
Live babies	8 (15.4)	3 (37.5)	5 (62.5)
Stillbirths	44 (84.6)	29 (65.9)	15 (34.1)

rupture in this and other studies buttresses the fact that the uterus becomes weaker and more prone to rupture with increasing parity.<sup>(1,2,7-9,15,17,20,21)</sup> The desire for large size families in Nigeria increases the prevalence of grandmultiparity and plays a role in the causation of uterine rupture.<sup>(9,15,21)</sup> In contrast, grandmultiparity is now a rare cause of uterine rupture in Singapore.<sup>(3,12)</sup>

Unbooked parturient mothers have accounted for the majority of cases in this and other studies from Nigeria<sup>(1,17)</sup> and Ethiopia.<sup>(2)</sup> Unbooked patients often receive no care during pregnancy,<sup>(1,2,9)</sup> are poorly managed in labour<sup>(1,22)</sup> and are usually in a poorer pre-surgical clinical state at presentation.<sup>(23)</sup> These factors worsen maternal and foetal outcomes, with an associated increase in morbidity and mortality. Unlike in Singapore, where cephalopelvic disproportion causes rupture only in patients with intact uteri,<sup>(3)</sup> obstructed labour was the commonest cause of rupture in patients with both intact and scarred uteri in this study and is still a leading cause of uterine rupture in Nigeria.<sup>(7,9,15,16)</sup> Although preventable, obstructed labour has continued to thrive in Nigeria because of the high rates of unbooked pregnancies and the preference shown by the majority of booked patients to undergo labour outside of the hospital.<sup>(1,2,22)</sup> Other factors that contributed to uterine rupture in this study, such as high parity,<sup>(1,20,21)</sup> abnormal lie,<sup>(1)</sup> injudicious oxytocic use,<sup>(2,9,20)</sup> a retained second twin and breech presentation,<sup>(2)</sup> are related to a lack of quality obstetric care<sup>(1,2,9,16)</sup> in unbooked patients and in booked patients who elected to undergo labour outside of the hospital.<sup>(1,22)</sup> Of these factors, only oxytocic use has been reported as a cause of uterine rupture in Singapore,<sup>(3)</sup> where its use has been documented in 46.2% of cases as opposed to 5.9% of the cases in this study. The spontaneous preterm rupture of a scarred uterus with twin pregnancy demonstrates that scarred uterus is unsafe in pregnancy,<sup>(12)</sup> especially if there is gross uterine enlargement. Quality antenatal care may salvage such cases.

Surgical decision-making in uterine rupture is influenced by factors such as the patient's parity, her desire for more children and the intraoperative assessment of the rupture, with the desire for large

families as an important cofactor.<sup>(21)</sup> Uterine repair alone was the most commonly performed surgery in this series and accounted for 88.2% of the surgeries. This is in keeping with the hospital's advocacy for conservative surgical management,<sup>(5)</sup> and differs from other reports from Nigeria,<sup>(1,7,8,15,20)</sup> Ethiopia,<sup>(2)</sup> Sudan<sup>(24)</sup> and Singapore,<sup>(3,12)</sup> where uterine repair with tubal ligation, subtotal hysterectomy and total abdominal hysterectomy have featured prominently. The maternal mortality rate of 5.9% found in this study compares favourably with 4.9% in Enugu<sup>(15)</sup> in southeast Nigeria and 7% in Sudan,<sup>(24)</sup> but it is significantly lower than the mortality rate of 11.1%–22.0% ( $p < 0.05$  at 95% CI) found in southwestern<sup>(1,9)</sup> and northern<sup>(7,20)</sup> Nigeria and Ethiopia,<sup>(2)</sup> and is significantly higher than the rates of 1.16% and 3.8% found in Singapore.<sup>(3,12)</sup> Although the other reports from Nigeria originated from tertiary hospitals,<sup>(1,7,9,20)</sup> the findings collectively show that ruptured uterus is still a major public health concern in Nigeria.<sup>(1)</sup>

In Nigeria, despite the rising incidence of ruptured uterus, the associated maternal mortality rate appears to be declining.<sup>(15)</sup> This is in contrast to reports from Singapore where Chen et al<sup>(3)</sup> documented a huge decrease in the incidence of ruptured uterus but with an associated three-fold increase (1.16%–3.8%) in the maternal fatality rate some ten years after the study conducted by Chew.<sup>(12)</sup> In this study, all the maternal deaths involved unbooked mothers, highlighting the fact that unbooked pregnancies are a major contributor to maternal mortality in Nigeria.<sup>(25)</sup> When booked pregnant mothers opt to go into labour outside the hospital, they face similar risks as the unbooked mothers, such as sub-optimal care with poor maternal and foetal outcomes. The maternal deaths recorded in this study resulted from hypovolaemia<sup>(1,8,20)</sup> secondary to massive haemorrhage<sup>(25)</sup> and septicaemia.<sup>(20)</sup> These were compounded by delayed presentation.

The foetal case fatality rate of 84.6% in our study lies within the 75.4%–100% range found in other studies in Nigeria<sup>(1,7-9,15,20)</sup> and some developing countries,<sup>(2,24)</sup> but is higher than the rate of 17.6% in Turkey<sup>(14)</sup> and 7.4% in Singapore.<sup>(3)</sup> Therefore, although a ruptured uterus has great potential to cause high perinatal mortality, its effect can be curtailed by the introduction of modern and quality obstetric care.

In conclusion, not only is ruptured uterus a common occurrence in Nigeria, but its frequency is also still increasing. Moreover, the associated perinatal and maternal death rates are high. The main antecedent factors, such as grandmultiparity, unbooked

pregnancies, obstructed labour, the injudicious use of oxytocics, abnormal lie and abnormal presentation, are preventable through quality obstetric care. By curbing obstructed labour, quality obstetric care prevents uterine rupture and improves maternal and foetal outcomes. However, quality obstetric care requires strategically located, properly equipped and well-staffed hospitals. In Nigeria, the technical knowledge that is required to tackle uterine rupture and its complications does exist, but bad governance<sup>(1)</sup> and a lack of effective strategies<sup>(19)</sup> cause them to continue unabated. There is an urgent need for acceptable, accessible, affordable and sustainable quality obstetric care in order to curb the menace of ruptured uterus. Health education is also required to create and increase awareness regarding the complications associated with grandmultiparity, unbooked pregnancies and deliveries outside of hospitals, and to improve the acceptance and utilisation of hospitals, thereby reducing the proportion of deliveries that occur outside of hospitals. Since cost is a major reason for patients opting to deliver outside of hospitals, obstetric care should be subsidised for improved acceptance. Sustainability requires increased healthcare funding. Therefore, the government may need to partner with non-governmental organisations and international funding bodies to achieve this aim. The activities of TBAs should be streamlined and regularly monitored, with a view to improving their practice and patterns of patient referral. Existing hospitals should be properly equipped and staffed, and newer hospitals should be built closer to remote communities.

In summary, awareness campaigns, academic and economic empowerment, improved mobilisation of doctors and nurses, training and retraining of care providers, infrastructural improvements and the effective utilisation of health facilities<sup>(20)</sup> are required in order to curb the incidence of ruptured uterus and its complications. This warrants an overhaul of our health system.<sup>(1)</sup>

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