The incidence of uterine rupture varies widely across different regions and countries. In developing countries, such as Enugu, Lagos, Ilorin, and Ife, the incidence is reported to be 1 in 106–273 deliveries. 

In developed countries, despite the increased caesarean section rate, uterine rupture is uncommon with an incidence between 1 in 1148 and 1 in 2250 deliveries. This wide variation in incidence is due to variables such as the obstetric risk factors in a given population and the level of expertise of personnel and facilities for care of the obstetric patient.

Uterine rupture occurs during labor and delivery and to a lesser extent during pregnancy. In Nigeria, the incidence remains high because of poverty, illiteracy, unavailability of financial and human resources, and the associated factors including previous caesarean section, obstructed labor, and injudicious use of oxytocin.

Introduction

Rupture of the gravid uterus is an obstetric emergency with significant fetomaternal consequences. It is an obstetric accident that exposes the flaws and inequities of health systems in the society at large due to the degree of neglect that it entails. Uterine rupture is a potentially catastrophic event, especially during childbirth in which the integrity of the myometrial wall is breached. Lack of financial and human resources paves the way for unskilled delivery, obstructed labor, and subsequently uterine rupture.

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ABSTRACT

Background: Uterine rupture remains a major life-threatening obstetric disaster encountered in many developing countries and is associated with a high maternal and perinatal mortality and morbidity. Objectives: The objective of this study was to determine the incidence, associated risk factors, trend, clinical presentation, management as well as maternal and fetal outcome of uterine rupture at the Lagos University Teaching Hospital (LUTH), Lagos, Nigeria. Materials and Methods: This was a retrospective study of patients with uterine rupture at the LUTH, Ibadan, Nigeria, from June 1, 2005 to May 31, 2013. The case records of patients in this period were retrieved from the medical health records department. The relevant data of sociodemographic characteristics, clinical presentation, management as well as maternal and perinatal outcome were collated using a structured questionnaire. Results: Of the 13,138 deliveries during the study period, there were eighty cases of uterine rupture giving a hospital incidence of 6.1/1000 deliveries. Patients with parities of 1 (28.36%) and 2 (38.81%) were identified to be at higher risk of uterine rupture. Previous caesarean section (46.28%), obstructed labor (26.87%), and injudicious use of oxytocin (16.42%) were the common associated factors. Rupture along previous anterior scar was the most common site affected in 32.84%; repair with bilateral tubal ligation was the surgical procedure in most of the cases (47.76%). The case fatality rate for ruptured uterus was 11.94% for the mothers and the perinatal mortality rate of 791/1000 babies. Conclusion: Uterine rupture is a major cause of maternal and perinatal death in Lagos, Nigeria.

Key words: Maternal mortality, perinatal mortality, uterine rupture

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of skilled workforce, poor medical facilities, and dwindling health-care funding.[3] These worsening economic conditions, increasing cesarean section rates, and some patients’ aversion for operative deliveries had made uterine rupture remain a major obstetric complication.

**MATERIALS AND METHODS**

This was a retrospective study of ruptured uterus managed at the Lagos University Teaching Hospital (LUTH) from June 1, 2005 to May 31, 2013. The case records of patients in this period were retrieved from the medical health records department.

The data extracted include sociodemographic characteristics, parity, booking status, clinical presentation, management, and outcome. The data were analyzed using Statistical Package for Social Sciences version 17. SPSS Inc. Chicago, IL USA. Categorical variables were compared using Chi-square test or Fisher-exact test as appropriate while continuous variables were compared using t-test. A $P < 0.05$ was considered as statistically significant.

**RESULTS**

During the study period, there were 13,138 deliveries and eighty cases of uterine rupture giving an incidence of 6.1/1000 deliveries. Out of the eighty cases of uterine rupture in the study period, 67 (83.75%) of the patients’ case records could be retrieved and was subsequently analyzed. Table 1 shows the sociodemographic characteristics of the patients.

Figure 1 shows the yearly trend of patients with ruptured uterus in the period of review. Peak occurrence was in 2010 with 24 (30%) of patients in that period. Least occurrence was in 2005 with only 3 (3.8%) patients though this was for only part of the year at the time the study review commenced.

The identified risk factors in the patients reviewed include previous caesarean section that accounted for 31 (46.27%) of those who had uterine rupture. Out of these, twenty had one previous caesarean section in the past while 11 had two previous caesarean sections in the past. Eighteen (26.87%) of the patients had obstructed labor from various causes while oxytocin use was implicated in 11 (16.42%) of the patients. Obstetric manipulations, forceps delivery, and assisted breech deliveries accounted for 3 (4.48%), 1 (1.49%), and 3 (4.48%) of cases, respectively.

The odds ratio for uterine rupture from previous caesarean section, obstructed labor, injudicious oxytocin usage, obstetric manipulations, assisted breech delivery, and forceps delivery were 0.8611, 0.3672, 0.1964, 0.0469, 0.0469, and 0.0147, respectively. Comparing previous caesarean section and obstructed labor, the odds ratio of uterine rupture was 2.3441 (95% confidence interval [CI] of 1.1378–4.8294), $P = 0.0197$. Furthermore, comparing previous caesarean section and injudicious oxytocin usage, the odds ratio of uterine rupture was 4.3838 (95% CI of 1.9594–9.808), $P = 0.0002$. However, comparing obstructed labor and injudicious oxytocin usage, the odds ratio of uterine rupture was 1.8701 (95% CI of 0.8054–4.3424), $P = 0.1416$.

As in Table 2, abdominal pain was the most common symptom identified and was present in all the 67 cases reviewed (100%). Abdominal tenderness and abdominal distension were the most common general signs seen in 65 (97.01%) of the cases. Pallor and tachycardia were seen in 57 (85.07%) and 54 (80.60%) of cases, respectively. Easily palpable fetal parts and vaginal bleeding were seen in 52 (77.61%) of cases. Many patients, however, had multiple symptoms and signs.

Rupture along previous lower segment anterior scar was the most common accounting for 22 (32.84%) of the

### Table 1: Sociodemographic characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency (n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–24</td>
<td>6</td>
<td>8.95</td>
</tr>
<tr>
<td>25–29</td>
<td>19</td>
<td>28.36</td>
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<tr>
<td>30–34</td>
<td>22</td>
<td>32.84</td>
</tr>
<tr>
<td>35–39</td>
<td>16</td>
<td>23.88</td>
</tr>
<tr>
<td>40 and above</td>
<td>4</td>
<td>5.97</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>31±4.7</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>19</td>
<td>28.36</td>
</tr>
<tr>
<td>2</td>
<td>26</td>
<td>38.81</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
<td>20.89</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>4.48</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>5.97</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>1.49</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100</td>
</tr>
<tr>
<td>Booking status</td>
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<td></td>
</tr>
<tr>
<td>Booked</td>
<td>10</td>
<td>14.93</td>
</tr>
<tr>
<td>Unbooked</td>
<td>57</td>
<td>85.07</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100</td>
</tr>
</tbody>
</table>
cases reviewed while other anterior rupture occurred in 19 (28.36%) cases. Posterior and lateral ruptures were seen in 13 (19.40%) and 9 (13.43%) of the cases, respectively. In 4 (5.97%) of the cases, rupture occurred in a combination of sites.

Repair with bilateral tubal ligation (BTL) was done in the majority of patients reviewed accounting for 32 (47.76%) of cases. Subtotal hysterectomy was done in 25 (37.31%) cases while only 4 (5.97%) of cases had repair without BTL and 5 (7.46%) of cases had total hysterectomy. One woman (1.49%), however, died at surgery before any substantial intervention could be done for her.

Maternal comorbidities occurred in the postoperative period with hospital stay >14 days occurring in 18 (26.87%) of the women. Majority of the patients had more than one complication. The most common postoperative complication was anemia with packed cell volume <30% which occurred in 54 (80.6%) of cases reviewed. Others include septicaemia 9 (13.43%); wound infection 8 (11.94%); and renal failure 4 (5.97%). Two (2.99%) of the cases reviewed developed depression in the postoperative period after having subtotal hysterectomy done. One of whom had only one living child. One (1.49%) of the cases developed vesicovaginal fistula in the postoperative period and accounted for part of the patients who had prolonged hospital stay.

Mean estimated blood loss was 2031.3 ± 1006.3 ml. Three (4.5%) of the patients reviewed had an estimated blood loss <500 ml; 9 (13.4%) from 500 to 999 ml; 30 (44.8%) from 1000 to 2499 ml while 25 (37.3%) of the cases had an estimated blood loss ≥2.5 liters.

There were eight maternal deaths and 53 fetal deaths during the study period giving a case fatality rate of 11.94% for the mothers and perinatal mortality rate of 791/1000 babies.

**DISCUSSION**

The incidence of ruptured uterus in this review was 6.1/1000 deliveries (1 in 164 deliveries). The reason for this high incidence can be adjudged to the fact that LUTH is a referral center and most complicated obstetrics cases are referred to the center. When compared with an earlier study done at the same center, the reported incidence was 1 in 200 deliveries. This indicates a 1.2-fold increase in incidence at the same center. One would have expected that the incidence of ruptured uterus should be on the decline giving the increasing number of obstetricians, registrars in training, and other skilled health workers in this health-care facility and the widespread use of partograph in labor. This was, however, not the case as the majority of these women with ruptured uterus were unbooked (85.07%) and they came in very critical condition that not much difference in the outcome of care, especially for the babies could be achieved.

Although this study identified significant risk of uterine rupture in women with previous caesarean section as compared with women with obstructed labor and injudicious oxytocin usage, the presence of other identified factors such as obstetric manipulations, assisted breech delivery, and forceps delivery may have an additional deleterious effect such that the combined effect of these multiple risk factors makes a woman more predisposed to having ruptured uterus.

Equally worrisome is the unbooked patients that constituted majority of the women that had ruptured uterus who were not only referred late but also had inadequate and suboptimal care during pregnancy and labor. It is also needful for continuous auditing of care provided in the center so as to improve on services provided. There is an urgent need to do a community survey as well as interaction with peripheral health-care providers to find out why patients are referred late when they are already in critical conditions.

Health education, provision of free, functional and effective maternal and child health care services may address some of these problems. Prompt identification and management of high risk pregnancies should also be emphasized.

The incidence of ruptured uterus is comparable with studies done in other centers in Nigeria, Ilorin, and Ife with incidences of 1 in 210 and 1 in 273 deliveries, respectively, though the incidence is slightly reduced in this study. Advanced maternal age and multiparity are generally accepted as important associated factors in the etiology of ruptured uterus, in particular grand multiparity. In this study, unlike other studies where grand multiparous women were at higher risk, grand multiparous women accounted for only 5 (7.46%) while women who had delivered 1–3 times before constituted the majority of women with ruptured uteruses. 59 (88.06%). Some of these women may suffer from psychological trauma, especially if the mode of treatment was removal of the uterus thus curtailing future birth possibilities. None of the patients in the study were primigravidas which are in keeping with studies that ruptured uterus rarely occurs in that...
The women aged 30–34 years formed the largest number of those with ruptured uterus; 22 (32.84%). The women aged ≥35 formed 20 (29.85%) of those in the study showing that advancing maternal age is an associated factor as noted in other studies. There is no definite pattern in the yearly trend but peak occurrence was noted in 2010. This is difficult to explain, perhaps because there was no industrial action in that particular year compared to others. This could explain the increase in number of referrals to LUTH for that year.

Previous caesarean section scar was the most common associated factor identified in this study (46.27%). This was followed by obstructed labor accounting for 26.87%. Injudicious use of oxytocin was the third leading identified factor in 16.42%; this was contrary to the Ilorin study, where oxytocin use was the most common associated factor identified, followed by previous scar and then obstructed labor.[7]

Rupture along the previous scar was the most common site in the study series seen in 22 (32.84%) of the cases reviewed. This was unlike other studies which reported anterior segment as the most common site of rupture,[7] anterior rupture in this study occurred in 19 (28.36%) of patients.

The earliest sign of uterine rupture is fetal heart rate abnormalities,[3] however, since most of the patients reviewed in this study were unbooked, they presented with more overt symptoms and signs. All of the patients reviewed presented with abdominal pain 67 (100%) while 57 (85.07%) and 52 (77.61%) of the patients presented with pallor and vaginal bleeding, respectively. In one study, abdominal pain, tenderness, and vaginal bleeding were the predominant clinical features at presentation.[11]

The management of ruptured uterus should begin with active resuscitation using plasma expanders and transfusion with blood with concurrent definitive surgical treatment planned. The definitive surgical treatment should be individualized depending on patient’s clinical state, age, desire for future childbearing, the skill of the surgeon, type, and extent of the rupture.[7,9] It is also generally accepted that speed is an important factor in surgical management and it is essential that the easiest and shortest procedure should be attempted in each case. In this study, repair of site of rupture with BTL was the most common procedure in 32 (47.76%) of the cases while repair alone was done in only 4 (5.97%). This is comparable with other studies done in Lagos and Ilorin, where repair with BTL was the most common procedure done.[6,7] Subtotal hysterectomy was done in 25 (37.31%) of the cases reviewed in this study.

Postoperatively, out of the total number of patients reviewed in this study, 54 (80.60%) had postoperative anemia, 8 (11.94%) had wound infection, 2 (2.99%) suffered from depression which was seen in the patients who had hysterectomy done with low parity and 1 (1.49%) developed vesicovaginal fistula. Vesicovaginal fistula and wound infection were common postoperative complications found in Ethiopia.[12]

The maternal case fatality rate was 11.94% and the perinatal mortality rate of 791 per thousand babies, respectively, were similar to the study done in Ilorin.[7] Maternal mortality rate for uterine rupture was, however, 30% in a study done in the state teaching hospital in Lagos.[1] The main cause of death was hypovolemic shock as excessive hemorrhage usually occurs following uterine rupture. The intensity of initial resuscitation plays a major role in determining maternal outcome.[1] The perinatal mortality rate of 791 per thousand babies in this study though high but <92% obtained in the study in a State Teaching Hospital in Lagos.[1]

Most cases of uterine rupture are preventable. The need for antenatal care and hospital delivery should be emphasized through health education. Primary centers should be encouraged to refer patients with obstructed labor early to prevent complications. In addition, patients with previous caesarean section scars should be counseled on the need for hospital deliveries in subsequent pregnancies. Those planned for vaginal birth after caesarean section must be carefully selected and labor must be closely monitored to detect very early warning signs.

CONCLUSION
Rupture of the uterus remains a major issue in developing countries. Reinforcement of the need for hospital-based deliveries, especially in patients with previous caesarean sections should improve outcome. Injudicious oxytocic usage should be discouraged.

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Conflicts of interest
There are no conflicts of interest.

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