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ARTICLE in INTERNATIONAL JOURNAL OF OBSTETRIC ANESTHESIA · MAY 2006
Impact Factor: 1.6 · DOI: 10.1016/j.ijoa.2005.10.009 · Source: PubMed

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Anaesthesia for uterine rupture in a Nigerian teaching hospital: maternal and fetal outcome

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Background: An observational retrospective study was conducted at the University of Nigeria Teaching Hospital (UNTH), Enugu, Nigeria to determine the outcome for patients with rupture of the gravid uterus who had anaesthesia for laparotomy over a four-year period, July 2000 to June 2004.

Methods: The hospital records (case files, labour ward and theatre records) of patients over a four-year period with rupture of the uterus were reviewed.

Results: A total of 2707 deliveries took place at UNTH, Enugu, Nigeria. There were 2556 live births (94.8% of deliveries) and 714 (26.4%) caesarean deliveries. Twenty-three cases of uterine rupture occurred, giving a prevalence of 8.5/1000 deliveries. In nine patients (39.1%) the uterus was already scarred. The patients' mean age was 30.2 years. No nulliparous patients suffered ruptured uterus. General anaesthesia with muscle relaxants was administered to all patients. Twenty-two patients (95.6%) received blood transfusions. All the patients received normal saline and one patient also received Haemacel®. Five (21.7%) patients had preoperative hypotension and two (8.6%) had intraoperative hypotension. There was one maternal death which occurred three days after the cesarean section. Twenty-three (96.3%) fetal deaths, including the loss of a set of twins, were recorded. Fetal deaths from ruptured uterus represented 32.4% of all fetal loss following caesarean section during the study period. There were no neonatal deaths.

Conclusion: Rupture of the gravid uterus presents the anaesthetist with the unique challenge of maintaining haemodynamic status before haemostasis is secured, often with the patient in shock. Choice of anaesthetic drugs and availability of blood are important, as well as the skill and experience of the anaesthetist. The maternal mortality rates in other West African studies reviewed were generally higher than those in this series. The maternal outcome re-emphasises the vital role of prompt intervention and availability of blood in reducing maternal mortality following rupture of the uterus.

Keywords: Anaesthesia; Uterine rupture; Maternal and fetal outcome

INTRODUCTION

Uterine rupture is an obstetric emergency that poses a serious threat to the life of both mother and fetus. Because the gravid uterus receives 12% of the cardiac output, when uterine rupture occurs, haemorrhage can be extremely rapid.1 Classically, uterine rupture is said to be painful, but asymptomatic rupture occurs in a significant number of patients.2,3 In addition to haemorrhage, uterine rupture may result in urologic injury, maternal death and perinatal complications including neurologic impairment and death.4,5

With the urgent need to control haemorrhage, anaesthesia may have to be induced in patients who are hypovolaemic and hypotensive, and ultimately a hysterectomy may be needed to save the mother’s life.4 A review of the literature revealed a paucity of studies on anaesthetic challenges in the management of ruptured uterus in West Africa, a term used to designate a geographic region within the continent of Africa comprising 19 countries.

This study examines the maternal and fetal outcomes following anaesthesia in patients with ruptured gravid uterus and proffers suggestions on how to reduce incidence, morbidity and mortality.
METHODS

The hospital records including case files, labour ward and theatre records of parturients with uterine rupture who underwent laparotomy at the University of Nigeria Teaching Hospital (UNTH), Enugu, Nigeria from July 2000 to June 2004 were retrospectively reviewed. This hospital serves as a referral centre for hospitals in Enugu State of Nigeria.

The patients’ demographic data and antenatal records, booking status, previous mode of delivery, parity and gestational age at rupture were recorded and analysed. The anaesthetic technique used, and maternal and fetal outcomes were also noted. Diagnosis of uterine rupture in this series was based initially on the history and physical examination and confirmed during surgery. Blood loss was based on estimates of blood in suction bottles, drapes, swabs and haemoperitoneum.

RESULTS

There was a total of 2707 deliveries at the University of Nigeria Teaching Hospital during the four-year study period. There were 2566 (94.8%) live births with 714 (26.4%) parturients undergoing caesarean deliveries.

Twenty-three cases of uterine rupture occurred giving a prevalence of 8.5 uterine ruptures per 1000 deliveries. Nine affected patients (39.1%) had previous caesarean section scars but in the majority the uterus was unscarred. Only five of the parturients (21.7%) were booked and received antenatal care, but the majority were unbooked.

The age of the patients ranged from 21-40 years with a mean age of 29.5 ± 4.5 years. Table 1 shows the parity of the patients. All were multiparous. Nineteen of the pregnancies (82.6%) were full term, one patient suffered ruptured uterus at 36 weeks and three parturients (13.0%) were unsure of their dates. Four patients (17.4%) had subtotal hysterectomies while the rest had uterine repair. Twenty-two patients (95.6%) received 21 units of blood during their successful resuscitation, which included a femo-femoral anastomosis. She had had a hysterectomy following uterine rupture with fetal demise. There was one maternal death two years after the repair of her uterine rupture with Sheehan’s syndrome.

One woman had twins. Twenty-three of the 24 babies (95.8%) died in utero, including both twins. There were no neonatal deaths. These deaths represented 32.4% of all fetal losses in the hospital during the study period.

<table>
<thead>
<tr>
<th>Parity</th>
<th>Number with uterine rupture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nulliparous</td>
<td>Nil</td>
</tr>
<tr>
<td>1-2</td>
<td>6</td>
</tr>
<tr>
<td>3-4</td>
<td>12</td>
</tr>
<tr>
<td>≥5</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2. Estimated blood loss and volume of blood transfused

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Estimated blood loss</th>
<th>Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 23 (100%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (13.0%)</td>
<td>0.5-0.9</td>
<td>1.5 ± 0.67</td>
<td>0-2</td>
</tr>
<tr>
<td>6 (26.1%)</td>
<td>1-1.9</td>
<td>1.7 ± 0.47</td>
<td>1-2</td>
</tr>
<tr>
<td>7 (30.4%)</td>
<td>2-2.9</td>
<td>1.6 ± 0.49</td>
<td>1-3</td>
</tr>
<tr>
<td>7 (30.4%)</td>
<td>3-4</td>
<td>2.1 ± 1.22</td>
<td>1-5</td>
</tr>
</tbody>
</table>

*aIncluding haemoperitoneum. fluids before induction of general anaesthesia. Normal saline was given to all patients. Crystalloids are the intravenous fluid of choice in our institution because of cheaper cost and availability. There was one documented use of a colloid (Haemacel®) in this series. Two patients required intraoperative medication for hypotension. Their preoperative blood pressures were 95/60 mmHg and 100/50 mmHg respectively and both had intraoperative blood pressures of 80/50 mmHg. One received adrenaline (0.1 mg twice) and the other hydrocortisone 300 mg.

General anaesthesia was used in all the patients because of the risk of hypotension with spinal or epidural anaesthesia in patients who may have lost large volumes of blood. The drugs used for anaesthesia depended on the patients’ haemodynamic status. All the patients were premedicated with diazepam 10 mg i.v. and atropine 10-20 µg/kg i.v.. Intravenous ketamine 2 mg/kg was used in all the patients for induction followed by the application of Sellick’s manoeuvre and suxamethonium 2 mg/kg to facilitate laryngoscopy and intubation. Anaesthesia was maintained with ketamine, nitrous oxide/oxygen, oxygen/air, or halothane 0.5% if the patient was haemodynamically stable, with pancuronium for muscle relaxation. Postoperatively, the patients were nursed in the postnatal ward or the intensive care unit (ICU).

Three patients (13.0%) were admitted to the ICU postoperatively and had satisfactory outcomes. One patient with iatrogenic injury to an internal iliac artery received 21 units of blood during her successful resuscitation, which included a femo-femoral anastomosis. She had had a hysterectomy following uterine rupture with fetal demise. There was one maternal death in this review. This patient died of haemorrhage and acute renal failure (prerenal) three days after surgery, while still on the postnatal ward. Three patients (13.0%) suffered bladder injuries. One woman presented two years after the repair of her uterine rupture with Sheehan’s syndrome.

One woman had twins. Twenty-three of the 24 babies (95.8%) died in utero, including both twins. There were no neonatal deaths. These deaths represented 32.4% of all fetal losses in the hospital during the study period.
DISCUSSION

The reported incidence of uterine rupture ranges from 0.55/1000 deliveries in some parts of the western world,6 to 2.44-23/1000 deliveries in developing countries.7–12 The exact incidence of uterine rupture in West Africa is difficult to ascertain due to the absence of national databases. Uterine rupture reportedly contributes to 13% of maternal mortality in the West African region.13 The incidence of ruptured uterus in some parts of Southern Nigeria is reported to be 4.8–5.0/1000 deliveries and as high as 13.5/1000 deliveries in Sokoto, Northern Nigeria.7,8,14 In the West African region, a report from Burkina Faso put the incidence at 23/1000 deliveries,12 a very high rate. The incidence of uterine rupture in this series, at 8.5/1000 deliveries, was intermediate.

In Asia rates have been reported to vary from 0.26/1000 deliveries in Taiwan,6 to 10/1000 deliveries in Bangladesh9 and 10.7/1000 deliveries in Pakistan.16 The rates in Sokoto, Nigeria and Burkina Faso were attributed to inadequate health care services, including inadequate manpower. In our centre the high prevalence of ruptured uterus was attributable to the patients’ failure to make use of the available health care services, as 78.3% of them were unbooked. Most of these women were from the surrounding rural areas within easy reach of the hospital. Some patients preferred using the maternity homes rather than the teaching hospital, probably because of a lack of funds or the proximity of the homes. Transportation is easier to arrange during daylight hours than night-time because commercial vehicles discontinue operations during the evening.

Uterine rupture occurs in both the scarred and unscarred uterus but more often in the scarred uterus in developed countries.15 In some parts of the developing world with poor health care delivery systems, uterine rupture in the unscarred uterus is more common due to prolonged, obstructed labour and cephalo-pelvic disproportion.10,11,16 With uterine scar dehiscence after caesarean section and similar uterine operations the altered pattern of uterine contraction and abnormal fetal heart rate may be the only clinical features. Women in most developing countries including Nigeria are averse to caesarean section and insist on trial of labour even at the risk of their lives. A high index of suspicion is essential for early detection of ruptured uterus to avoid fetal loss, especially in centres without facilities for continuous fetal monitoring.

Sixty percent of uterine ruptures in this study occurred in the unscarred uterus. This is similar to other reports from the developing world.7–11 An Israeli study reported that 50.9% of uterine ruptures were in the unscarred uterus.15 This is different from the trend in the western world where uterine rupture in the unscarred uterus is reportedly rare.6 Inadequate antenatal care services, poverty and injudicious use of oxytocin contribute to the high incidence of rupture in the unscarred uterus in developing countries.9,14 It was difficult to ascertain the number of parturients who had labour induced with oxytocin in our study as few maternity homes report what actually transpired before referral. Four patients (17.4%) in this study had subtotal hysterectomies. This is lower than the figures from Ghana where 70% of the women had hysterectomies11 and 26.7% in Sagamu, Nigeria.17

General anaesthesia was used in all the patients. Spinal and epidural anaesthesia were not considered because of the risk of hypotension and the urgency required in securing haemostasis. Epidural analgesia during labour is rare even though the anaesthetists are trained to provide it, due to the absence of epidural equipment.

Ketamine has proved to be a reliable agent for both induction and maintenance of anaesthesia in hypovolaemic patients because of its positive inotropic effect.18 Ketamine is used as a sole anaesthetic agent in many parts of the West African region. The tendency to cause emergence delirium and increased secretions is ameliorated by the use of diazepam and atropine, both of which are readily available. Because ketamine is a relatively inexpensive drug, it is commonly used in obstetric practice in our centre. Since benzodiazepines (diazepam) are used as part of premedication in obstetrics, we rarely have problems with emergence delirium. Thiopentone and propofol are available but are rarely used for induction of anaesthesia for cesarean section with obstetric haemorrhage because of potentially increased hypotension. Both drugs are also more expensive than ketamine. We balance cost and economy in the management of patients in order to reduce the financial burden. With the recent takeoff of the National Health Insurance Scheme (NHIS) patterned after the American model, things might improve for Nigerians with an insurance policy.

There was one death among the 23 cases reviewed. This death was recorded three days after surgery in a patient who died of postpartum haemorrhage and acute renal failure (prerenal) while still on the postnatal ward. She had presented before anaesthesia with a blood pressure of 80/50 mmHg and a pulse rate of 142 beats/min. There was an estimated blood loss of 2.5 L (including a haemoperitoneum of 2 L). She was managed with normal saline and transfused four units of blood, one unit preoperatively, one unit intraoperatively and 2 units postoperatively.

This somewhat low mortality figure was possible with experienced anaesthetists, availability of blood and the hospital policy of treating emergency cases before demanding any sort of payment. This is important because health insurance is still a novel concept in the
country and patients have to pay for their treatment before discharge from the hospital. Some companies, including banks and government agencies, do pay for their workers’ health care to some degree. Hospital workers get limited free treatment in their centres.

The delivery suite at our centre is extremely well staffed with experienced personnel,19 who should be well-versed in the management of patients with obstetric haemorrhage. The relative availability of blood and trained staff greatly helped in safeguarding the parturients who suffered from ruptured uterus in this study. This was the result of the hospital’s policy of having each antenatal patient arrange for the donation of a unit of blood for them by their relatives or friends. Since most patients don’t require blood transfusions, there is often adequate blood for emergencies. However, we are very careful in transfusing blood because of the long window period in some human immunodeficiency virus (HIV) carriers who may be ‘commercial’ blood donors. This explains why the average unit of blood transfused in this series was 1.75 units compared to the average blood loss of about 2 L per patient. The donors are screened for HIV, hepatitis B and C, syphilis and malaria. The enzyme-linked immunosorbent assay (ELISA) method is used for screening the donors’ blood for antibodies to HIV, hence our justified caution in transfusing patients.

Fluid therapy in our patients was guided by non-invasive monitoring of the blood pressure, manual palpation of the pulse for volume and rate, and regular auscultation of the lung fields for evidence of pulmonary oedema. One reason why colloids are not popular is the cost (500 mL of Haemacel costs about 22 US dollars compared to a litre of normal saline at 58 US cents). One unit of blood costs about 30 US dollars.

The University of Nigeria Teaching hospital Enugu is affiliated with the University of Nigeria, whose medical students it trains. The hospital is entirely funded by the federal government of Nigeria. While patients are charged for services, the money received usually falls short of that required for normal functioning of the hospital. The hospital is located in a town with a population estimated at 308 200,20 and a good number of the obstetric emergencies come from other centres in the town and the rural areas around Enugu. The town itself has a sizeable number of obstetric clinics run by privately employed obstetricians, mission hospitals and maternity homes run by trained midwives and sometimes poorly qualified practitioners.

There are three tiers in Nigeria’s health care delivery system: primary, secondary and tertiary health care centres. Fewer rural women deliver at home than in the primary health centres (non specialist health centres served by trained nurses and one or two general practitioners [GPs]) and privately owned maternity homes. The secondary health care centres include the mission and most general hospitals staffed by GPs and a few specialists, and the tertiary care centres with specialists and better equipment. Due to a paucity of physician anaesthetists, most of the general hospitals and mission hospitals make use of nurse anaesthetists. Cases that come to the teaching hospitals are referred from these various centres. The fear of obstetric complications during home deliveries and campaigning by the health authorities have led more women to deliver in health care institutions.

This, however, does not prevent some women from choosing a vaginal delivery when a caesarean section might be safer. Sadly, some of them then present to us with a ruptured uterus. It is quite difficult to ascertain the true number of women who die before arrival in the hospital. These figures are unavailable and estimates are bound to be imprecise. The problem in Nigeria with the health care system is not a lack of health institutions but of resources, namely drugs, equipment and specialist care. Southern Nigeria is more educationally advanced than the north due to earlier contact with Europeans and acceptance of western education. This is reflected by the fact that five of the first six university teaching hospitals are in the south. The north is rapidly catching up, however, with good organisation of facilities, and it now has six of the 16 federal government-funded teaching hospitals. Moreover, almost 50% of the Nigerian population live in urban areas.20

Nigeria is the world’s sixth largest producer of crude oil and some of the money went into building hospitals, but in the past decade things regressed badly with poorly equipped hospitals and a lack of even the most basic drugs such as opioid analgesics. This economic reversal in the country resulted in increased commercialisation of the hospital services, decline in maternity utilisation and predominance of high-risk deliveries and complicated cases in the tertiary centres. Vast areas with poor logistics and poor referral practices, poverty, fear of and aversion to caesarean section adversely affect the use of maternity services in Enugu and pose considerable challenges.

Maternal and fetal morbidity and mortality might have been reduced if patients had presented to the hospital earlier. A broad multidisciplinary approach is needed to resolve the late presentation to hospitals. Reorganisation of maternity care services with emphasis on development of referral systems, provision of emergency obstetric services including adequate blood bank and transfusion services as well as better equipped health services for caesarean section and emergency laparotomy with trained anaesthetists is advocated. Socioeconomic factors like availability of transportation and lack of financial means can be tackled through poverty alleviation, economic empowerment and introduction of a maternal health insurance scheme. Training of more
physician anaesthetists will lead to more providers skilled in fluid resuscitation.

CONCLUSION

Patients with rupture of the gravid uterus present the anaesthetist with the unique challenge of maintaining haemodynamic status, while haemostasis is being secured before the patient’s circulation is fully stabilised. Choice of anaesthetic drugs and availability of blood are important, as well as the skill and experience of the anaesthetist. The maternal mortality rates in other West African studies reviewed were generally higher than those in this series.

ACKNOWLEDGEMENTS

We thank the staff of the records department, labour ward and obstetric theatre for their help during this study. We especially thank Drs P Ufoegbunam and E Efetie for their assistance, and Mary Nwodo, who graciously typed the manuscript.

REFERENCES