ORIGINAL RESEARCH ARTICLE

Audit of cases with uterine rupture: a process indicator of quality of obstetric care in Angola

Strand RT[1], Tumba P[2]; Niekowal J[2]; Bergström S[1]

[1]Division of International Health (IHCAR), Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden; [2]Maternidade (Maternity) Augusto N´Gangula, Luanda, Angola.

***For Correspondence:** Roland T Strand. *E-mail:* rolandstrand@swipnet.se.

ABSTRACT

Audit of uterine rupture (UR) used as a process indicator, can identify factors considered avoidable to improve future quality of obstetric care. Records of UR cases at a referral maternity in Luanda were studied retrospectively (n=43) and prospectively (n=67) including basic obstetric information, maternal and foetal outcome, duration of labour, time interval between diagnosis and intervention, drugs used, type of delivery and intervention, surgical procedures and complications. A clinical estimation of avoidability was based on this information. Prevalence of UR was 4.9%. Maternal case fatality rate was 14% and early perinatal mortality 71%. Women with previous Caesarean Section (CS) constituted 28%, grand multiparous women 44% and primiparous women 6%. Uterotonic treatment was given in 36%. Avoidability was estimated to 65%. Regular morbidity-oriented audits with analysis of clinical management reveal weaknesses in obstetric care and may serve as an instrument for future improvement (*Afr. J. Reprod. Health* 2010; 14[2]:55-62).

RÈSUMÈ

Vérification des cas de la rupture de l'utérin : un indice du procès de la qualité du soin obstétrique en Angola. On peut identifier les facteurs qu'on considère comme évitables pour améliorer la qualité future du soin obstétrique si l'on se sert de la rupture de l'utérin (RU). Nous avons étudié les dossiers des cas de la RU dans une maternité spécialisée à Luanda. Ils ont été étudiés rétrospectivement (n = 43) et prospectivement (n = 67), y compris l'information obstétrique de base, les conséquences maternelles et focales, la durée du travail, l'intervalle de temps entre le diagnostic et l'intervention, les médicaments employés le genre d'accouchement et l'intervention, l'intervention chirurgicale et les complications. Une estimation clinique de la possibilité d'évitement a été basée sur cette information. La prévalence de la RU était 4,9%. Le taux de fatalité des cas maternels était 14% et la périnatale précoce était 71%. Les femmes qui ont eu la section césarienne (SC) auparavant ont constitué 28%, les femmes multipares constituaient 44% et les femmes primaires constituaient 6%. On a donné un traitement utérotonique à 36%. L'évitement a été estimé à 65%. Les vérifications régulières qui sont orientées vers la morbidité y compris une analyse du traitement clinique ont révèle des défaits du soin obstétrique et peut servir d'instrument d'une amélioration future (*Afr. J. Reprod. Health* 2010; 14[2]:55-62).

KEYWORDS: Africa, audit, avoidability, maternal mortality, process indicator, quality of care, uterine rupture.

INTRODUCTION

Uterine rupture (UR) is a life-threatening emergency for both mother and foetus. It has been estimated that one in five maternal deaths from haemorrhage is related to UR [1]. The prevalence of UR is 0.05-0.8/1,000 deliveries in high income countries [2], but higher in low-income countries[3]. Earlier African studies show a wide range from 0.8 to 18/1,000 deliveries[4,5]. A combination of social exploitation of women, lack of medical facilities and delays in seeking, reaching and receiving effective care for various reasons all contribute to these high figures.

Maternal mortality ratio (MMR) in Angola is among the highest in the world, estimated at 1,400 maternal deaths per 100,000 live births[6]. This partly reflects the conditions in a country suffering from decades of warfare which has ruined much of Angola and starved its people. A peace agreement has finally been signed in 2002.

At present institutional MMR is the only available instrument to assess quality of obstetric care in the capital Luanda and has shown a decrease from 2,070 in 1994 to 772 in 1997 (Estatística anual de saúde materna institucional). Parallel to a rekindling of the war and deterioration in the conditions for internal refugees, institutional MMR again increased to 888 in 1999. The total number of institutional deliveries the same year was more than 61,000, accounting for less than 50% of all estimated births in the city. At the two central maternity hospitals in the city, UR contributed in 1997 to direct obstetrical deaths in 7% and 14%, respectively. We decided to review all cases of UR during 1998 and 1999 at Maternidade Augusto N´Gangula (MAN), the maternity hospital with the highest UR mortality.

There is an increasing awareness that death as an outcome indicator is a blunt instrument for assessing quality of obstetric care. MMR reflects not only the level of medical care, but also various background factors in the society, from the likelihood of becoming pregnant to the propensity and possibility of seeking obstetric care. MMR is based on unreliable figures in a majority of low income countries. The actual number of live births is also uncertain in a setting where a significant proportion of women deliver outside the health system. Maternal deaths have often been shown to be grossly underreported in both developing and industrialized countries[7,8,9]. With outcome indicators, like MMR, being recognized as inappropriate, attention has lately focused more on process indicators to evaluate the quality of medical practice[10,11]. By addressing specific questions like the reasons for women's delay in seeking care, the causes of delay in receiving treatment and the risk of being subject to substandard quality of care, the different steps in a process can be studied[12]. With process indicators it is possible to analyze the different links in the chain of health care services, their availability, utilization and quality.

Clinic-based audit is among the interventions that have proven to be valuable in maternal health care[13]. Audit needs to be based on criteria that are realistic to the conditions in the field. Such a list of criteria has been suggested for the management of five life-threatening obstetric complications[11]. In cases of UR the criteria are limited to surgery, draining of the bladder and use of an observation chart. In this study the focus is on another aspect of audit by estimating the avoidability of UR[14]. By re-viewing the clinical events that preceded the UR, an overall assessment of each case was made. This analysis started at the time of the patient's admission to the maternity, thus dealing only with factors that were related to the responsibility of the institution, reflecting its quality of care. The purpose of this paper was to reconstruct the chain of clinical events and decisions to sort out which URs could have been prevented from those which could not in order to avoid similar mismanagement in the future.

METHODS

UR was defined as a tear in the uterine wall, excluding the uterine cervix, associated with maternal or foetal symptoms requiring surgical intervention.

During the two year period there was a total of 116 cases of UR (49 in 1998 and 67 in 1999). It was possible to collect and analyse 110 of these patient records.

The 43 cases retrieved in 1998 were analysed using available patient records. Basic obstetric data were collected from the admission sheet, including previous uterine scar, place of residence and number of antenatal care visits. Estimates of gestational age were based either on the last menstrual period or on clinical examination. By studying partographs and documented clinical observations, a tentative diagnosis on admission was established and an interval between diagnosis of either impending UR or UR and interventions was calculated. Additional circumstances, such as progress and management of labour, use of uterotonic drugs, type of delivery, surgical procedures, complications and maternal and foetal outcome, were also included. URs that occurred after admission to hospital were differentiated from those that had occurred earlier, at home, at the peripheral units or during transport. Referral documents from the peripheral birth units were also analysed.

In 1999 each new case (n=67) with UR was audited and analysed the day after surgery. The final analysis of the cases was then undertaken by the authors according to the same standard protocol as previously used.

All cases were analyzed according to avoidability. By stating that a UR could have been avoided, it is understood that it could have been prevented by using the treatment available at the hospital, had obstetric vigilance and practice been of good quality. The patients´ records and partographs were the main sources of information in this analysis. If, e.g., the so called “action line” of the partograph was not respected by either comment or action, the UR was considered “avoidable”.

Ethical clearance was obtained from the ethical committee at Karolinska Institutet after receiving approval at the local hospital.

For statistical comparison of proportions the Chi square method was used.

RESULTS

The prevalence of UR was 4.9/1,000 deliveries for the two periods studied, i.e. 116 cases among 23,733 deliveries (4.2/1000 in 1998 and 5.9/1000 in 1999). Among the 110 studied protocols, there were 15 maternal deaths (case fatality rate of 13.6%) representing 10.8% of all direct obstetric causes of maternal death in the two year period.

The mean age of women with UR was 28.3 years. No woman was under 15 years of age and 20 women (18.1%) were ≥ 35 years of age. Parity ranged from 0 to10 (excluding the index delivery) with a mean of 3.7 previous deliveries. There were seven primiparous women (6.4%) and 51 women (43.6%) were classified as grand multiparous (≥ 4 previous deliveries).

Previous caesarean section (CS) was documented in 31 women (28.2%). The over all CS rate during the two year study period was 7.2%.

More than 50 % (56 women) had at least two antenatal care visits, nine women had one visit and data were missing in the remaining records. All women suffering a UR came from Luanda or its vicinity. All but six women came from areas within 6 km from the hospital (data lacking in 3 cases).

Ninety-nine (90%) of the women were considered at term (≥37 completed weeks of gestation). One UR occurred at only 19 estimated weeks of pregnancy after the woman had received repeated doses of misoprostol due to missed abortion. Another case, classified as foetal death occurred at 27 gestational weeks and with a birth- weight of 500 g. The woman was 30 years old, in her fifth delivery and was admitted for pre-eclampsia with a blood pressure of 170/110 and absence of foetal heart activity. She was treated with misoprostol vaginally and oxytocin intravenously for the induction of labour. After one hour UR was suspected and the patient was taken to the operation theatre. A macerated foetus and a left side UR was found and a subtotal hysterectomy was performed.

Oxytocin was used to augment labor in thirty-four women (30.9%) with prolonged labor. One of them had undergone a previous CS. Misoprostol was used for induction of labour in eight women (7.3%), three of whom due to foetal death (including the woman of 19 weeks of gestation). No women treated with misoprostol had a previous uterine scar. Forty patients (36.4 %) had received some kind of uterotonic treatment, of whom two had received both misoprostol and oxytocin.

Table 1. Interval between diagnosis of UR / impending UR and intervention.

Time (min)	Number of patients
0-9	45 (38 during surgery)
10-30	10
31-60	20
61-120	15
121-180	7
No data	13
Total	110

Table 2. Type of foetal presentation in parturient women at Matenidade Augusto N´Gangula 1997-1998, with and without diagnosed uterine rupture (UR) (Chi square test for each presentation).

Presentation	UR	No UR	p-value
Cephalic	79 (82.3%)	22,498 (94.8%)	<0.01
Breech	7 (7.3%)	926 (3.9%)	<0.01
Transverse	10 (10.4%)	309 (1.3%)	<0.01
Total	96 (100%)*	23,733 (100%)	

* Data missing in 14 cases, including one twin delivery.

Perinatal mortality was at least 70.5 %. This figure accounts only for the 74 stillbirths documented (in five patient records data was missing). Information on neonatal deaths, not registered in direct association with the UR, was often impossible to retrieve and is therefore omitted here. Malformation was not documented in any of the records studied.

The duration between diagnosis of UR/ impending UR and intervention is presented in Table 1. In 48 women (43.6%) the diagnosis was set prior to birth or surgical intervention, in 38 women (34.5%) during laparotomy and in 24 women (21.8%) after vaginal birth. As expected the foetal presentations differed from women with no UR (Table 2).

Birth weight data was lacking in 15 cases (13.6%). Of the remaining cases there were nine children (9.7%) with a birth weight less than 2,500 g, (not including the two early pregnancies of 19 and 27 weeks of gestation). In only eight cases (8.6%) there was a registered birth weight of >4000g.

Corporal rupture occurred in five women and in 90 patients the rupture was in the lower segment of the uterus, including two posterior ruptures. Longitudinal rupture including both corpus and the lower segment was registered in seven cases. Information on type of rupture was lacking in eight patient records.

Hysteroraphy was performed in 50 women, subtotal hysterectomy in 36 and total hysterectomy in 16 women. In the latter two groups, there were also three cases of suture of bladder injury. In eight records data was lacking regarding type of surgery.

Other complications included eight cases of sepsis and five cases of shock, which led to the death of four women. There were also two fatal cases of disseminated intravascular coagulation. Two cases of ligation of the ureter and three cases of vesico-vaginal fistulas had uneventful maternal outcome.

The analysis of avoidability required a number of arbitrary distinctions. It was decided to consider an interval between diagnosis and intervention of less than 60 minutes, as being operationally acceptable, given the extraordinary logistical constraints in this overburdened setting. In 13 patients the diagnosis was set before or at admission and in 11 patients within one hour after admission with immediate preparation for surgery. These 24 cases of UR and six of the cases when UR was diagnosed after vaginal delivery without evidence of mismanagement were regarded as non-avoidable. In nine cases, the operation theatre was occupied, leading to a delay in intervention. According to the definition of avoidability, the URs of these women were also considered non-avoidable, giving a total of 39 cases (20 in 1998, 19 in 1999). The remaining 71 cases of UR (64.5%) were regarded avoidable at the hospital level.

DISCUSSION

This study has demonstrated that, in the setting studied, almost two out of three URs could in some respect be traced to inadequate obstetric care at the hospital receiving the parturient women. UR is one of the most serious complications that can be prevented in a setting with good obstetric vigilance and partograph culture.

The concept of "avoidability" is to some extent marked by clinical judgement. However, in cases where the crossing of the "action line" of the partograph was not commented or acted upon, this must be regarded as substandard care, regardless of the subjectivity of the authors.

Outcome indicators like MMR have proved to be inappropriate for comparison of quality of obstetric care over time. Process indicators, like UR incidence, are more useful when evaluating efforts in safe motherhood[15]. Review of cases with UR can provide a useful example of morbidity-specific audit, serving as an instrument to enhance quality of obstetric care. By revealing substandard care, a basis is established for further education and improvement of clinical routines and facilitates monitoring over time.

During the last years much emphasis has been given to the correct use and interpretation of the partograph in the in-service training of hospital staff in Luanda. A local translation of the WHO material on partograph use[16] has been completed and distributed to midwives and doctors at lectures and seminars. It was assumed that the partographs studied give a fairly accurate picture of the clinical situation.

The concept of avoidability of maternal death has previously been used in studies from low-income countries and revealed severe deficiencies in care[8,17]. A high proportion of avoidability of maternal deaths is, however, not confined to low-income countries[18]. The specific question of avoidability and UR has rarely been addressed. In order to consider the results on UR in an African context, the figures were compared with those from other studies from sub-Saharan Africa[4,5,19-26].

It was estimated that 24 women (21.8%) had a UR before or just after admission to the hospital, which is the same proportion as in Maputo [24]. In this study the diagnosis of UR was made after vaginal delivery or during surgery in 56.3% compared to 80% in Maputo [24]. In Lagos, on the other hand, 75% of the URs were diagnosed before surgery[24]. The variation in these figures reveals differences not only between countries, but also between regions, as shown in the reports from different parts of Nigeria[5,24,25]. A study from Botswana was based on few cases of UR, but might suggest a more effective obstetric care than in the other settings. These and similar studies have been displayed in Table 3.

Previous CS is considered the most important risk factor for UR[2]. This study found an over representation of UR among women with previous CS although the majority of UR was among women with an unscarred uterus, which is in agreement with reports from other low income countries[27]. With close monitoring of the wellbeing of both mother and foetus and with availability of obstetric, anaesthetic and surgical staff around the clock, attempted vaginal birth after caesarean section (VBAC) has been recommended by several authors[28,29]. In developed countries the prevalence of UR is around 1% among women with previous CR[29]. Yap et al reported 17 cases of UR out of 2,033 VBAC (0.8%), with no maternal death and two neonatal deaths of low gestational age[30]. Although the risk of UR increases almost threefold with VBAC, an estimated 370 elective CS need to be performed in order to avoid one symptomatic UR[31]. Thus, a routine of elective CS after previous CS may even increase the risk of maternal mortality[32]. In low-income countries, VBAC has been questioned. A meta-analysis of 17 sub-Saharan studies found a prevalence of UR of 2.1% and concluded that VBAC is relatively safe and can be practised, provided that there is access to emergency CS[33]. A reduction of primary CS

Table 3. Comparison of studies on uterine rupture in African settings.

Country	Ref	No	Year	Prevalence ‰	MCF %	PM %	Scar %	GMP %	PP %
Angola	Current study	110	98-99	4.9	13.6	70.5	28.2	46.3	6.3
Botswana	Rajab[4]	18	93-96	0.8	0	22.2	61.0	nd	nd
Conakry/G.	Balde[19]	81	85-86	8.4	20.9	75.3	21.0	nd	nd
Egypt	Elkady[20]	126	79-88	2.7	21.4	73.2	23.0	68.3	3.2
Ethiopia	Fekadu[21]	245	91-95	nd	5.3	98.0	9.8	50.6	0.8
Ghana	Adanu[22]	106	95-98	2.2	1.8	77.1	24.7	nd	nd
Mozambique	Zanconato[23]	96	90-91	2.4	7.3	62.9	45.8	29.6*	3.1
Nigeria	Ola[24]	80	85-92	5.0	17.5	86.3	27.5	25.0	7.5
Nigeria	Ekele[25]	43	95	13.5	38.0	98.0	10.0	nd	nd
Nigeria	Diallo[5]	50	nd	18.0	16.0	96.0	nd	nd	nd
Zambia	Nkata[26]	32	93-94	17.2	43.8	nd	9.4	18.8	43.8

Abbreviations used: Ref: reference, first author; MCF: maternal mortality as case fatality; PM: early perinatal mortality as case fatality; Scar: Previous CS; GMP: grand multiparous women (≥4 births; *in Mozambique ≥5 births); PP: primiparous women.

rates on vague indications must be emphasised in the first place.

Misoprostol was associated with UR in eight cases in this study, among which there was one case of missed abortion at 19 weeks. UR has previously been reported after treatment with misoprostol as early as in the 9th gestational week of a woman with previous CS[34] and the risk of UR after induction of abortion should not be neglected[35].

Grand multiparity is often considered a risk factor for UR[31], especially in combination with oxytocin stimulation. The risk of UR has been reported to be elevated 20 times in women who are para 7 or more[36], although Bique et al found no case of UR among 165 grand multiparous women induced with vaginal misoprostol in their study from Mozambique[37].

Primiparity, on the other hand, is no guarantee against UR. Most other settings have not reported a proportion of primiparous women as high as in Luanda (6.3%). This is surpassed only in a study from rural Zambia, where teenagers living far from the hospital were at greatest risk[26].

Macrosomia of the baby increases the risk of foeto-pelvic disproportion and thereby, theoretically, the risk of UR. Only two children with a birth weight of >4,500 g were found in this study. Over the last decades there has been an increase in birth weight in several high-income countries without any reported increase in UR[38]. This suggests, again, that UR is mostly a diagnosis related to inadequate quality of care.

In conclusion, this study shows that a majority of URs could have been avoided and represent the level of possible improvement regarding this complication. During the second year the personnel was aware of the ongoing study and the risk of being scrutinised at regular audits. One could therefore expect to find a higher proportion of non-avoidable UR, a lower case fatality rate and a lower prevalence of UR during this period. The reasons why this did not occur are not clear. The elevated number of births in 1999 might have implied the passing of yet another limit at which quality of care is hampered in an already heavily overburdened situation. As long as structural changes are not made to address unmet needs, improved audit and monitoring of women at risk may not be sufficient.

Performing morbidity - specific audit by

highlighting major weaknesses in obstetric care does not automatically lead to an immediate change in clinical behaviour, but offers an important tool to sensitise staff on the issue of avoidability.

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