

Epidemiological, Clinical, Therapeutic, and Prognostic Features of Uterine Rupture at the National Hospital Center of Pikine in the Suburbs of Dakar, Senegal

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Abstract

Introduction: Uterine rupture remains one of the most severe obstetric emergencies and is associated with substantial maternal and perinatal morbidity and mortality, particularly in low-resource settings. This study aimed to describe the epidemiological, clinical, therapeutic, and prognostic characteristics of uterine rupture at the National Hospital Center of Pikine, Senegal. **Methods:** We conducted a retrospective, descriptive, and analytical study in the Department of Obstetrics and Gynecology of the National Hospital Center of Pikine between January 1, 2020, and May 31, 2024. All women diagnosed with and/or managed for uterine rupture during the study period were included. Data were extracted from patients' medical records, operative reports, and the FileMaker Go 19 electronic database and analyzed using SPSS version 26.0. Statistical significance was set at $p < 0.05$. **Results:** Sixty-four cases of uterine rupture were identified among 16,373 deliveries, corresponding to an incidence of 0.39%. The mean maternal age was 30.8 ± 6.3 years. Multiparous women accounted for 37.5% of cases, and 57.8% had a previous uterine scar. More than half of the patients (57.8%) were referred from other healthcare facilities. Uterine rupture occurred during labor in 84.4% of cases and predominantly involved the lower uterine segment (59.4%). Complete uterine rupture was observed in 73.4% of patients. Conservative uterine repair was performed in 79.7% of cases, whereas hysterectomy was required in 20.3%. The most frequent maternal complications were acute anemia (57.8%), acute kidney injury (10.9%), and postoperative infection (6.3%). The maternal case-fatality rate was 4.7%, while the perinatal mortality rate was 34.4%.

Keywords

Uterine Rupture, Uterine Scar, Obstetric Hemorrhage, Maternal Morbidity, Perinatal Mortality, Senegal

1. Introduction

Uterine rupture is defined as a complete or partial disruption of the uterine wall occurring during pregnancy or labor. It represents a major obstetric emergency because of its association with severe hemorrhage, hypovolemic shock, hysterectomy, maternal death, and perinatal mortality [1]-[3]. Although its incidence is low in high-income countries, where it occurs predominantly in women with a previous cesarean scar attempting a trial of labor after cesarean (TOLAC), it remains considerably higher in low-resource settings, particularly in the presence of prolonged obstructed labor, delayed referral, and inappropriate use of uterotonic agents [2]-[6]. In Senegal, hospital-based studies have reported varying incidences and outcomes depending on the study period and the level of referral healthcare facilities [4] [7] [8]. In the context of evolving obstetric practices and the increasing number of women with previous uterine scars, updated epidemiological data are needed. Therefore, the present study aimed to describe the epidemiological, clinical, therapeutic, and prognostic characteristics of uterine rupture at the National Hospital Center of Pikine, Senegal.

2. Materials and Methods

A retrospective, descriptive, and analytical study was conducted in the Department of Obstetrics and Gynecology of the National Hospital Center of Pikine, a tertiary referral hospital (Level III) located in the suburbs of Dakar, Senegal. The study period extended from January 1, 2020, to May 31, 2024. All cases of uterine rupture diagnosed and/or managed in the department during the study period were included, regardless of the mode of delivery. Cervical tears not extending to the lower uterine segment or the uterine body, as well as uterine injuries resulting from induced abortion or trauma, were excluded.

Data were extracted from patients' medical records, operative reports, and the FileMaker Go 19 electronic medical database before being entered into Microsoft Excel. Statistical analyses were performed using SPSS software (version 26.0). Categorical variables were summarized as frequencies and percentages, whereas continuous variables were expressed as means and ranges. For bivariate analyses, the Chi-square (χ^2) test or Fisher's exact test was used to compare categorical variables, while Student's t-test was applied to compare continuous variables. Statistical significance was defined as a two-sided p value < 0.05.

The variables analyzed included sociodemographic and obstetric characteristics (maternal age, gravidity, parity, antenatal care attendance, gestational age, type of pregnancy, and previous surgical history); clinical characteristics at admission

and circumstances of uterine rupture (mode of admission, reason for referral, stage of labor, onset of labor, and fetal presentation); delivery characteristics (mode of delivery and birth weight); anatomical features of uterine rupture; therapeutic management; and maternal and fetal outcomes.

Uterine rupture was classified as complete when all three layers of the uterine wall were involved and as incomplete when the lesions involved the endometrium and myometrium without involvement of the serosa. This distinction was made solely during surgical exploration.

3. Results

3.1. Epidemiological Characteristics

During the study period, 64 cases of uterine rupture were recorded among 16,373 deliveries, representing a frequency of 0.39%. The mean age was 30.81 years (range: 17 - 45 years); 60.9% of patients were between 25 and 35 years old. The mean parity was 3 (range: 0 - 9). Multiparous women accounted for 37.5% of the sample, pauciparous women 29.7%, primiparous women 26.6%, and nulliparous women 6.3%. A scarred uterus was found in 58.0% of patients (**Figure 1**).

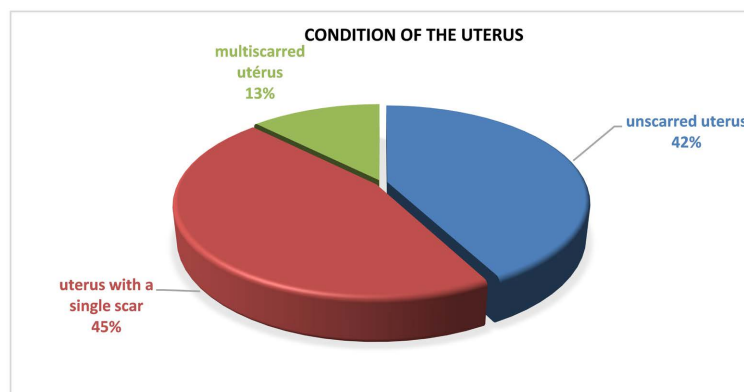


Figure 1. Distribution of patients according to uterine scar status.

3.2. Clinical Characteristics

Thirty-seven patients (57.8%) were referred from another health facility, whereas 27 (42.2%) were admitted directly. The main reasons for referral were labour in a scarred uterus (17.2%) and failure of engagement (10.9%). Only one patient was referred with a diagnosis of uterine rupture, while another was referred for impending uterine rupture syndrome (**Figure 2**). In contrast, 89.1% of the referred patients had already experienced uterine rupture at the time of admission to our department.

Term pregnancies accounted for 79.7% of cases, compared with 14.1% preterm and 6.3% post-term pregnancies. Fifty patients (78.1%) had attended at least four antenatal care visits, whereas 14 (21.9%) had attended one to three visits.

Pregnancy was singleton in 96.9% of cases. Fetal presentation was cephalic in 90.6%, breech in 6.3%, brow in 1.6%, and transverse in 1.6%.

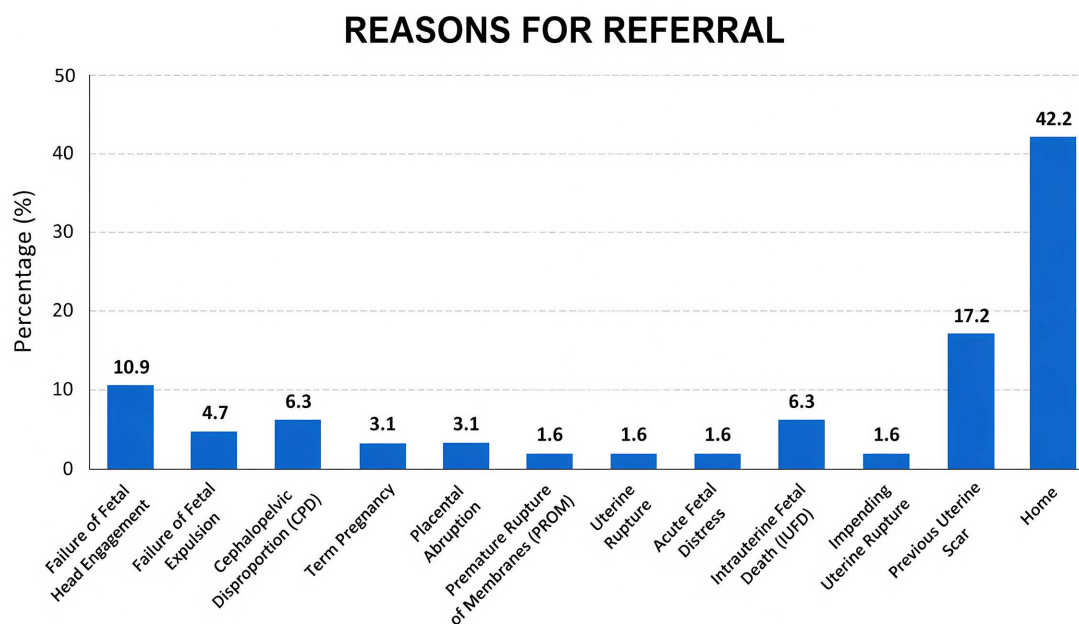


Figure 2. Reasons for referral.

Clinical pelvimetry was considered normal in 70.3% of patients and abnormal in 29.7%.

3.3. Labour and Delivery Characteristics

At the time of rupture, 84.4% of patients were in labour. Labour began spontaneously in 78.1% of cases, labour was induced in 6.3%, and 15.6% underwent caesarean section before labour. Vaginal delivery occurred in 10.9% of patients, whereas fetal extraction was performed by laparotomy in 89.1%. Birth weight ranged between 2500 and 3499 g in 53.1% of cases (**Table 1**).

Table 1. Onset of labour, mode of delivery and birth weight.

Parameters	Variables	Percentage (%)
Onset of labour	Spontaneous labour	78.1
	Induction	6.3
	Caesarean before labour	15.6
Mode of delivery	Vaginal delivery	10.9
	Laparotomy	89.1
Birth weight	<2500 g	18.8
	2500 - 3499 g	53.1
	3500 - 3999 g	25.0
	≥4000 g	3.1

Uterine rupture occurred during the latent phase in 51.6% of cases and during

the active phase in 28.1%. Among patients not in labour (15.6%), rupture was discovered incidentally during a scheduled caesarean section for a scarred uterus. The timing of rupture was not documented in 4.7% of cases. Rupture involved the lower uterine segment in 59.4% of cases, was segmento-corporeal in 28.1%, and corporeal in 12.5%. Among patients with a previous uterine scar, 31 of 37 (83.3%) had a lower uterine segment rupture, compared with 7 of 27 (25.9%) among those with an unscarred uterus. The presence of a uterine scar was strongly associated with lower uterine segment rupture (OR = 14.76; 95% CI: 4.33 - 50.34; $p = 0.0002$). Complete rupture occurred in 73.4% of cases and incomplete (subserosal) rupture in 26.6%. Lesions were confined to the uterus in 78.1% of patients. Associated injuries were present in 21.9%: cervical (9.4%), vaginal (7.8%), and bladder (4.7%). No rectal injuries were observed.

3.4. Management and Outcomes

Management was both medical and surgical. Conservative uterine repair was performed in 79.7% of patients, whereas hysterectomy was performed in 20.3%. Bladder, cervical, and vaginal injuries were repaired when present. Thirty-seven patients (57.8%) with severe hemorrhage and hemodynamic compromise were admitted to the intensive care unit and received fluid resuscitation, blood transfusion, and oxygen therapy. The main maternal complications were acute anemia (57.8%), acute kidney injury (10.9%), and postoperative infection (6.3%). Maternal and fetal mortality were assessed in the short and medium term during the hospital stay. Three maternal deaths were recorded, corresponding to a case-fatality rate of 4.7% among patients with uterine rupture; two of these deaths were associated with placental abruption and coagulopathy. Fetal mortality was 34.4% ($n = 23$) among the 67 births, including 4.5% macerated stillbirths. All fresh stillbirths occurred in patients with complete uterine rupture ($p = 0.0001$) (**Table 2**).

Table 2. Maternal management and maternal and fetal outcomes.

Parameters	Variables	Percentage (%)
Maternal management	Conservative uterine repair	79.7%
	Hysterectomy	20.3%
	Admission to the intensive care unit	57.8%
	Blood transfusion	57.8%
Maternal outcomes	Acute anemia	57.8%
	Acute kidney injury	10.9%
	Postoperative infection	6.3%
	Maternal death	4.7%
Fetal outcomes	Total number of births (one set of twins and one set of triplets)	67
	Fetal mortality	34.4%
	Macerated stillbirths	4.5%

4. Discussion

4.1. Epidemiological Aspects

The frequency observed (0.39%) confirms that uterine rupture remains an uncommon obstetric complication among all deliveries, although it is considerably more frequent than that reported in high-income countries [3] [9] [10]. However, comparisons should take into account the referral level of healthcare facilities, the definitions used, and the proportion of referred patients. Higher frequencies have been reported in several sub-Saharan African series, particularly from Mali, Guinea, Madagascar, and Nigeria [5] [11]-[14]. The referral-center status of the CHNP, delays in patient transfer, and difficulties in intrapartum monitoring may have contributed to the observed frequency, as 89.1% of referred patients had already experienced uterine rupture at the time of admission to our department. The predominance of women aged 25 - 35 years reflects the period of highest reproductive activity. Multiparity, frequently reported in African series, may increase exposure to obstructed labour and repeated use of uterotonic agents; however, it should not be interpreted in isolation as a causal factor [5] [11] [15]. Associations between maternal age, parity, and uterine rupture were not formally tested in our analysis and should therefore be interpreted with caution. The high proportion of referred patients (57.8%) is consistent with findings from African studies, where uterine rupture is commonly managed in referral hospitals following delayed transfer [5] [11] [12]. This highlights the importance of early recognition of labour dystocia, effective communication between healthcare facilities, and the availability of medical transport. Most uterine ruptures occurred in women with a previous uterine scar (58.0%), in contrast to older African studies in which rupture of an unscarred uterus predominated [5] [13] [14]. This trend may reflect the increasing caesarean section rate and, consequently, the growing number of pregnant women with a uterine scar. In this group, the choice of mode of delivery should be individualized, and a trial of labour should only be undertaken in facilities capable of performing immediate caesarean delivery and advanced maternal resuscitation [16] [17]. Rupture of an unscarred uterus remains exceptional in high-income countries but continues to be of particular concern in settings where prolonged obstructed labour, delays in management, and inappropriate use of oxytocin or prostaglandins persist [10] [18]. Nevertheless, the low induction rate observed in our series does not allow any causal relationship to be established. The reduced biomechanical strength of scar tissue constitutes the pathophysiological basis for the risk of uterine scar dehiscence or rupture during labour [19].

4.2. Antenatal Care and Diagnostic Circumstances

Although 78.1% of women attended at least four antenatal care visits, information regarding the quality, content, and timing of these visits was unavailable. Therefore, the number of antenatal visits alone is insufficient to assess the quality of antenatal care. The World Health Organization recommends a minimum of

eight antenatal contacts to improve the detection of pregnancy complications and women's overall pregnancy experience [20]. The high proportion of cephalic presentations also indicates that uterine rupture was not limited to dystocic presentations. Antenatal identification of risk factors, early recognition of labour dystocia, and development of an individualized birth plan are particularly important for women with a previous uterine scar. Nevertheless, uterine rupture may occur in the absence of obvious predictive factors; therefore, close intrapartum clinical monitoring and rapid access to emergency surgery remain essential [16] [17]. Labour was spontaneous in the majority of cases. Induction or augmentation of labour after a previous caesarean section may increase the risk of uterine rupture depending on the induction method and the clinical context [21]-[23]. These interventions should follow standardized protocols, with continuous maternal and fetal monitoring and immediate access to surgical intervention. Suspected or confirmed uterine rupture requires emergency laparotomy combined with maternal haemodynamic resuscitation, fetal extraction, and haemorrhage control. The choice between conservative uterine repair and hysterectomy depends on the extent of uterine injury, maternal haemodynamic status, future fertility wishes, and the surgical team's experience [1] [2] [24]. In our series, diagnosis following vaginal delivery in 10.9% of patients highlights the importance of considering uterine rupture in cases of unexplained postpartum haemorrhage or maternal shock.

4.3. Anatomical Lesions and Surgical Management

The predominance of complete ruptures (73.4%) and lower uterine segment injuries (59.4%) is comparable to findings from numerous African hospital-based studies [5] [11]-[14]. The association between lower segment rupture and a scarred uterus is anatomically plausible since most caesarean section scars are located in the lower uterine segment. Segmento-corporeal extension and associated cervical, vaginal, or bladder injuries may indicate advanced uterine rupture and delayed management. These lesions increase surgical complexity, transfusion requirements, and the risk of maternal morbidity [1] [2] [24]. Conservative uterine repair was performed in 79.7% of cases, whereas the multicentre Senegalese study by Cissé *et al.* historically reported a higher proportion of radical surgery [4]. This trend toward uterine preservation has also been described in more recent Senegalese and West African studies [7] [8] [25]. However, conservative management remains dependent on achieving adequate haemostasis and the absence of irreparable uterine damage. Optimal management requires a multidisciplinary team, rapid access to blood products, anaesthesia and intensive care services, and, when urological injuries are present, appropriate surgical expertise. Limited blood supply and delays in referral remain major challenges in resource-limited healthcare systems [5] [11] [12].

4.4. Maternal and Fetal Outcomes

The maternal case fatality rate of 4.7% and fetal mortality rate of 34.4% remain

high despite improvements compared with several older African studies [4] [5] [11]-[14]. Acute anaemia was the most frequent maternal complication, emphasizing the predominantly haemorrhagic nature of this obstetric emergency. The observed association between complete uterine rupture and fresh stillbirth confirms the severe fetal consequences of full-thickness uterine rupture. In high-income countries, maternal mortality is exceptional; however, uterine rupture remains associated with severe maternal morbidity and a substantial risk of perinatal hypoxia and death [3] [9] [10].

4.5. Strengths and Limitations

This study provides recent data from a referral hospital located in the suburbs of Dakar. However, its retrospective design exposes it to missing data and information bias. As a single-centre hospital-based study, the findings cannot be generalized to the entire Senegalese population. Furthermore, the absence of a control group precludes the identification of independent risk factors. Finally, referral delays, detailed information on uterotonic use, the quality of antenatal care, and early neonatal outcomes were insufficiently documented.

5. Conclusion

Uterine rupture accounted for 0.39% of all deliveries managed at CHNP. It occurred predominantly in women who were in labour, were referred from other healthcare facilities, and had a previous uterine scar. Complete ruptures and lower uterine segment ruptures were the most common anatomical patterns. Despite the frequent use of conservative surgical management, maternal morbidity, maternal case fatality, and fetal mortality remained substantial. Improving outcomes requires safer management of labour after previous caesarean section, close intrapartum monitoring, protocol-based use of uterotonic agents, timely referral, and the continuous availability of multidisciplinary surgical, anaesthetic, and blood transfusion services.

Ethical Considerations

Confidentiality and anonymity of collected data were guaranteed throughout the research process.

Conflicts of Interest

The authors declare no conflicts of interest related to this article.

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