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Original Research Article

Vaginal delivery among women with a uterine scar in a referral maternity hospital in Senegal: frequency, associated factors and perinatal outcomes, 2020–2023

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ABSTRACT

Background: To determine the frequency and factors associated with vaginal delivery among women with a uterine scar at Pikine National Hospital, Senegal.
Methods: This retrospective cohort study included women with a uterine scar who delivered between January 2020 and December 2023. Factors associated with vaginal delivery were assessed using multivariable logistic regression.
Results: Among 2,993 women, delivery mode was documented for 2,984; 706 (23.7%) delivered vaginally and 2,278 (76.3%) by cesarean. Vaginal delivery decreased from 25.8% in 2020 to 21.4% in 2023 (p=0.034 for variation across years). In complete-case analysis (n=1,768), admission during active or expulsive labor was associated with higher odds of vaginal delivery (adjusted odds ratio [aOR] 6.51, 95% confidence interval [CI] 4.39–9.67). Lower odds were associated with at least two uterine scars (aOR 0.04, 95% CI 0.02–0.09), non-cephalic presentation (aOR 0.48, 95% CI 0.25–0.90), post-term pregnancy (aOR 0.46, 95% CI 0.24–0.89), and admission before labor onset (aOR 0.11, 95% CI 0.07–0.17). Twenty-three uterine ruptures were recorded.
Conclusions: Nearly one-quarter of women with a uterine scar delivered vaginally. Labor stage at admission and number of uterine scars were strongly associated with delivery mode, highlighting the importance of antenatal assessment, intrapartum monitoring, and access to emergency cesarean delivery.

Keywords: Uterine scar, Vaginal delivery, Previous cesarean delivery, Trial of labor, Uterine rupture, Senegal

INTRODUCTION

Cesarean delivery is an essential intervention when medically indicated. However, its increasing use has resulted in a growing number of women being exposed to the cumulative consequences of repeat cesarean deliveries.[1,2] The World Health Organization emphasizes that the goal should not be to achieve a specific universal cesarean delivery rate, but rather to ensure access to cesarean delivery for all women who need it while avoiding unnecessary procedures.[1]

For women with a previous cesarean delivery, two main options are generally considered: a trial of labor with the aim of achieving vaginal birth or a planned repeat cesarean delivery. In appropriately selected women managed in facilities with adequate intrapartum monitoring and timely access to surgical intervention, international guidelines consider vaginal birth an appropriate option.[3,4] Success rates among women who actually undergo a trial of labor are generally reported to range from 60% to 80%, with higher success rates among women with a previous vaginal delivery, spontaneous labor, and an adequate interpregnancy interval.[3–5]

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In resource-limited settings, however, this strategy may be challenging because of delayed referrals, variability in antenatal care, limited immediate access to operating facilities, and the risk of uterine rupture.[6,7] In Dakar, a previous study conducted at the Centre Hospitalier National de Pikine reported a high rate of cesarean delivery among women with a history of cesarean delivery.[8] Updated evidence from a larger population was therefore needed.

The present study aimed to determine the proportion of vaginal deliveries among women with a uterine scar between 2020 and 2023, assess temporal trends, and identify associated maternal and obstetric factors

METHODS

Study design and setting

We conducted a retrospective descriptive and analytical cohort study in the Department of Gynecology and Obstetrics of the Centre Hospitalier National de Pikine, a referral maternity hospital in the Dakar region, Senegal. The study period extended from January 1, 2020, to December 31, 2023.

Study population and eligibility criteria

All women recorded as having a uterine scar who delivered at the study hospital during the study period were eligible for inclusion. Records with missing information on mode of delivery were retained for the description of the study flow but were excluded from analyses comparing outcomes according to mode of delivery. Clearly implausible values for the number of uterine scars, maternal age, parity, and number of antenatal care visits were considered missing after consistency checks.

Variables and definitions

The primary outcome was vaginal delivery, defined as spontaneous vaginal delivery, vacuum-assisted delivery, or delivery requiring obstetric maneuvers. The comparison group consisted of women who delivered by cesarean section. Explanatory variables included year of delivery, maternal age, parity, number of antenatal care visits, mode of admission, number of uterine scars, type of pregnancy, fetal presentation, gestational age at delivery, stage of labor at admission, and membrane status. Secondary outcomes included stillbirth, a 5-minute Apgar score <7, neonatal resuscitation, and uterine rupture.

The term “vaginal delivery among women with a uterine scar” was preferred to “successful trial of labor after cesarean” because the database did not allow reliable identification of all women for whom a trial of labor had been planned or actually initiated.

Statistical analysis

Categorical variables were summarized as frequencies and percentages. Continuous variables were summarized using means and standard deviations or medians, as appropriate. Comparisons were performed using the chi-square test or Fisher’s exact test. A complete-case multivariable logistic regression analysis was performed to identify factors independently associated with vaginal delivery. Results are reported as adjusted odds ratios (aORs) with 95% confidence intervals (95% CIs). Statistical significance was set at $p < 0.05$. Variables that could represent consequences of the obstetric management decision were not included in the primary multivariable model.

Ethical considerations

The study was based on retrospectively collected routine clinical data. Direct patient identifiers were not included in the analytical dataset, and patient confidentiality was maintained throughout the study. No direct contact with patients was undertaken.

RESULTS

Study population and frequency of vaginal delivery

Between 2020 and 2023, a total of 15,805 deliveries were recorded at the study hospital. A uterine scar was identified in 2,993 women. Mode of delivery was available for 2,984 women, of whom 706 (23.7%) delivered vaginally and 2,278 (76.3%) underwent cesarean delivery. Among the 706 vaginal deliveries, 671 were spontaneous vaginal deliveries, 33 were vacuum-assisted deliveries, and two involved obstetric maneuvers (Figure 1).

The proportion of vaginal deliveries differed significantly across study years ($p = 0.034$), decreasing from 25.8% in 2020 to 20.3% in 2022, followed by a slight increase to 21.4% in 2023 (Figure 2).

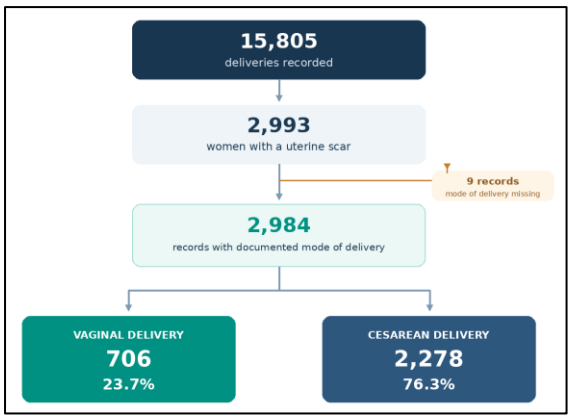


Figure 1: Flowchart of the study population.

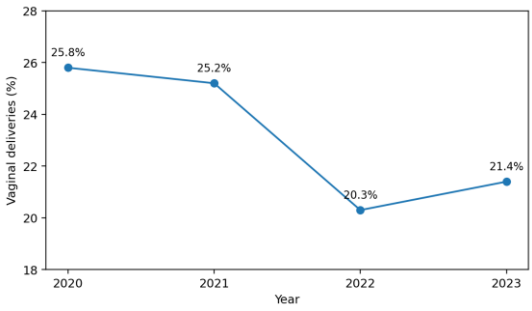


Figure 2: Trends in the proportion of vaginal deliveries from 2020 to 2023.

Characteristics according to mode of delivery

Mean maternal age was 29.2±5.8 years in the vaginal deliverygroup and 30.7±5.8 years in the cesarean delivery group. In bivariate analysis, vaginal delivery was more frequent among women younger than 25 years, women with high parity, women referred from another facility, women with a single uterine scar, those admitted during the active or expulsive phase of labor, and those with ruptured membranes. Vaginal delivery was uncommon among women with at least two uterine scars and among those admitted before the onset of labor (Table 2).

Factors independently associated with vaginal delivery

The complete-case multivariable analysis included 1,768 women, of whom 392 had a vaginal delivery. After adjustment, admission during the active or expulsive phase of labor and parity ≥4 were associated with a higher likelihood of vaginal delivery. Conversely, having at least two uterine scars, admission before the onset of labor, non-cephalic presentation, and post-term pregnancy were independently associated with a lower likelihood of vaginal delivery. Year of delivery and referral from another facility were no longer significantly associated with vaginal delivery after adjustment (Table 3).

Table 1: Annual trends in vaginal delivery among women with a uterine scar.

Year	Documented mode of delivery	Vaginal delivery	Proportion (%)
2020	929	240	25.8
2021	829	209	25.2
2022	454	92	20.3
2023	772	165	21.4
Total	2,984	706	23.7

Table 2: Main characteristics according to mode of delivery.

Characteristics	Cesarean delivery n (%)	Vaginal delivery n (%)	P
Age <25 years	377 (68.5)	173 (31.5)	
Age 25–34 years	1,267 (76.5)	390 (23.5)	<0.001
Age ≥35 years	632 (81.5)	143 (18.5)	
Admission from home	1,734 (77.7)	499 (22.3)	0.005
Referred from another facility	531 (72.4)	202 (27.6)	
One uterine scar	1,275 (67.9)	604 (32.1)	<0.001
At least two uterine scars	746 (98.2)	14 (1.8)	
Cephalic presentation	2,111 (76.0)	667 (24.0)	0.134
Non-cephalic presentation	154 (81.1)	36 (18.9)	
Admission before labor	1,294 (96.3)	50 (3.7)	<0.001
Latent phase	855 (68.9)	386 (31.1)	
Active or expulsive phase	109 (29.1)	265 (70.9)	
Intact membranes	2,009 (79.1)	531 (20.9)	<0.001
Ruptured membranes	251 (59.3)	172 (40.7)	

Table 3: Factors associated with vaginal delivery in multivariable analysis.

Variables	Adjusted OR	95% CI	P
Year 2021 vs 2020	0.96	0.57–1.60	0.863
Year 2022 vs 2020	0.93	0.53–1.62	0.800
Year 2023 vs 2020	1.05	0.62–1.77	0.870
Age <25 vs 25–34 years	1.19	0.84–1.70	0.327
Age ≥35 vs 25–34 years	0.73	0.50–1.06	0.101
Parity ≤1 vs 2–3	0.53	0.39–0.73	<0.001
Parity ≥4 vs 2–3	1.80	1.17–2.76	0.007
<4 ANC visits vs ≥4	1.44	1.03–2.00	0.032
Referral vs admission from home	0.91	0.67–1.26	0.582
≥2 uterine scars vs one	0.04	0.02–0.09	<0.001
Multiple vs singleton pregnancy	0.47	0.16–1.40	0.176
Non-cephalic vs cephalic presentation	0.48	0.25–0.90	0.022
Preterm vs term pregnancy	1.29	0.80–2.08	0.300
Post-term vs term pregnancy	0.46	0.24–0.89	0.020
Admission before labor vs latent phase	0.11	0.07–0.17	<0.001
Active/expulsive phase vs latent phase	6.51	4.39–9.67	<0.001
Ruptured vs intact membranes	0.86	0.59–1.23	0.400
Variable	Adjusted OR	95% CI	p
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ANC: antenatal care; OR: odds ratio; CI: confidence interval. The model was based on complete cases and simultaneously included all variables shown in the table.

Table 4: Perinatal outcomes and uterine rupture according to mode of delivery.

Outcomes	Cesarean delivery n/N (%)	Vaginal delivery n/N (%)	P
Stillbirth	69/2,256 (3.1)	44/701 (6.3)	<0.001
5-min Apgar score <7	53/2,188 (2.4)	19/656 (2.9)	0.481
Neonatal resuscitation	248/2,136 (11.6)	75/642 (11.7)	0.944
Uterine rupture	22/2,278 (1.0)	1/706 (0.1)	0.026

Perinatal outcomes and uterine rupture

Stillbirth was more frequent in the vaginal delivery group, whereas the frequencies of a 5-minute Apgar score <7 and neonatal resuscitation were similar between groups. However, the difference in stillbirth should not be interpreted as an effect of vaginal delivery, because some fetal deaths may have occurred before admission and may themselves have influenced the subsequent mode of delivery. A total of 23 uterine ruptures were recorded: 22 among women classified in the cesarean delivery group and one among women in the vaginal delivery group. This distribution should not be interpreted as indicating a higher risk of uterine rupture attributable to cesarean delivery, because uterine rupture may itself have prompted emergency laparotomy or cesarean delivery and may have precluded continuation of a planned vaginal birth (Table 4).

DISCUSSION

Principal findings

In this four-year retrospective cohort study conducted at a referral maternity hospital in Senegal, 23.7% of women with a uterine scar delivered vaginally. This proportion decreased from 25.8% in 2020 to 20.3% in 2022, followed by a slight increase to 21.4% in 2023. The number of uterine scars and the stage of labor at admission were the factors most strongly associated with mode of delivery. Admission during the active or expulsive phase of labor was associated with substantially higher odds of vaginal delivery, whereas having at least two uterine scars and being admitted before the onset of labor were strongly associated with lower odds of vaginal delivery. Early neonatal outcomes, as assessed by a 5-minute Apgar score <7 and the need for neonatal resuscitation, were similar between the two groups.

Comparison with previous studies

The overall proportion of vaginal deliveries observed in our study was comparable to the 23% reported in three university hospitals in Yaoundé, where only 30% of women were considered eligible for a trial of labor, with a success rate of 76.3% among those who underwent a trial .6 Our findings are also consistent with a previous study conducted at the Centre Hospitalier National de Pikine, in which 71.4% of women with a previous cesarean delivery ultimately underwent another cesarean delivery .8 These findings highlight an important methodological distinction. The overall proportion of vaginal deliveries among all women with a uterine scar is necessarily lower than the success rate reported among women who actually undergo a trial of labor.

According to the 2025 FIGO recommendations, successful vaginal birth after cesarean generally occurs in 60% to 80% of appropriately selected women .3 Previous African studies and meta-analyses have similarly identified previous vaginal delivery, spontaneous onset of labor, and favorable cervical dilatation as predictors of successful vaginal birth.[5,9,10]

Factors associated with vaginal delivery

In our study, women admitted during the active or expulsive phase of labor had more than sixfold higher adjusted odds of vaginal delivery compared with those admitted during the latent phase. This association probably reflects both the natural progression of labor before admission and clinical selection, as women presenting with advanced labor and reassuring maternal and fetal conditions are more likely to proceed to vaginal delivery.

Conversely, having two or more uterine scars was the factor most strongly associated with a lower likelihood of vaginal delivery. Current guidelines do not systematically exclude vaginal birth after two previous low-transverse cesarean deliveries; however, such cases require individualized assessment, appropriate counseling, and immediate access to emergency cesarean delivery .3,4 In our setting, the very low proportion of vaginal deliveries among women with multiple uterine scars probably reflects a cautious clinical approach as well as the frequent lack of reliable documentation regarding the type of previous uterine incision. In this context, women with two or more uterine scars are generally managed by repeat cesarean delivery.

Non-cephalic presentation and post-term pregnancy were also independently associated with lower odds of vaginal delivery. These findings are consistent with the literature, which indicates that fetal presentation, estimated fetal weight, maternal age, obesity, hypertensive disorders, and recurrence of the indication for the previous cesarean delivery may influence the likelihood of successful vaginal birth .3,5 Interestingly, fewer than four antenatal care visits were associated with higher adjusted odds of vaginal delivery. This finding should be interpreted cautiously and should not be considered evidence of a beneficial effect of inadequate antenatal care. Rather, it may reflect differences in referral patterns or later presentation during labor among women with fewer antenatal visits.

Uterine rupture and safety considerations

Uterine rupture remains the most serious complication associated with labor in women with a uterine scar. In our study, 23 uterine ruptures were recorded. Most occurred among women ultimately classified in the cesarean delivery group. This finding should not be interpreted as indicating that cesarean delivery increases the risk of uterine rupture, because rupture may itself have prompted emergency laparotomy or cesarean delivery and may have precluded continuation of a planned vaginal birth.

Studies from Senegal and Mali have emphasized the contribution of delayed referral, obstructed labor, and the quality of intrapartum care to the occurrence of uterine

rupture .7 Induction and augmentation of labor also require particular caution in women with a uterine scar, as some methods may increase the risk of uterine rupture compared with spontaneous labor .4

Strengths and limitations

The main strengths of this study include its large sample size, the four-year study period, the high completeness of key variables, and the use of recent data from a referral maternity hospital in Senegal.

Several limitations should nevertheless be acknowledged. First, the database did not reliably distinguish women who actually underwent a trial of labor from those for whom a repeat cesarean delivery had been planned. Therefore, the 23.7% vaginal delivery rate should not be interpreted as a TOLAC success rate. Second, information on the type of previous uterine incision, the indication for the first cesarean delivery, and some aspects of previous vaginal birth history was not sufficiently standardized. Third, the complete-case multivariable analysis included only 1,768 women, mainly because of missing data on gestational age and number of uterine scars. Fourth, comparisons of perinatal outcomes according to the final mode of delivery are subject to confounding by indication and reverse causality. Consequently, these comparisons should remain descriptive and should not be interpreted as evidence of a causal effect of one mode of delivery over the other. Finally, the lower number of records in 2022 could not be clearly attributed either to reduced clinical activity or to incomplete data collection.

CONCLUSION

In this referral maternity hospital in Senegal, nearly one in four women with a uterine scar delivered vaginally. Admission during the active or expulsive phase of labor was strongly associated with a higher likelihood of vaginal delivery, whereas multiple uterine scars, admission before the onset of labor, non-cephalic presentation, and post-term pregnancy were associated with a lower likelihood of vaginal delivery. These findings highlight the importance of establishing a dedicated antenatal assessment pathway for women with a uterine scar, standardizing documentation of uterine scar characteristics and planned trial of labor, and ensuring intrapartum monitoring in facilities with the capacity to perform a rapid emergency cesarean delivery when required.

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