Successful First Vaginal Birth after Cesarean Section: a Predictor of Reduced Risk for Uterine Rupture in Subsequent Deliveries

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Abstract

Background: Uterine rupture is a catastrophic obstetric complication, most often associated with a preexisting cesarean section scar. Although a vaginal birth after a cesarean is considered safe in modern obstetrics, it is not known whether repeated VBACs increase the risk of rupture, or whether the first VBAC proves the strength and durability of the scar, predicting further successful and less risky vaginal deliveries.

Objectives: To evaluate the effect of repeated vaginal deliveries on the risk of uterine rupture in women who have previously delivered by cesarean section.

Methods: In this retrospective study, 26 VBAC deliveries complicated by uterine rupture were matched for age, parity, and gravidity with 66 controls who achieved VBAC without rupture. The histories, demography, pregnancy, labor and delivery records, as well as neonatal outcome were compared.

Results: We found that the risk of rupture decreases dramatically in subsequent VBACs. Of the 40 cases of uterine rupture recorded during the 18 year study period, 26 occurred during VBAC deliveries. Of these, 21 were complicated first VBACs. We also found that the use of prostaglandin-estradiol, instrumental deliveries, and oxytocin had been used significantly more often during deliveries complicated with rupture than in VBAC controls.

Conclusions: Once a woman has achieved VBAC the risk of rupture falls dramatically. The use of oxytocin, PGE_2 and instrumental deliveries are additional risk factors for rupture, therefore caution should be exerted regarding their application in the presence of a uterine scar, particularly in the first vaginal birth after cesarean.

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Uterine rupture is a catastrophic obstetric complication and a major cause of maternal and fetal morbidity and mortality during labor. It is most often associated with an existing cesarean section scar. Uterine rupture has been variously reported as occurring in 1:220 to 1:3,871 vaginal births after cesarean section [1–3]. This risk remains significant because of the increased number of cesarean deliveries observed during the last two decades, from 5 to 25% of births in the United States and other western countries [4–8]. Rupture can also occur in women who have not undergone a previous cesarean. Multiparity and overuse of oxytocin are contributing factors to the risk of this complication in non-VBAC women, whereas higher maternal age, use of PGE_2 and instrumental delivery are thought to increase the risk of rupture in women with or without a previous cesarean section [2,9].

Although VBAC is considered a safe approach in modern obstetrics [10–17], the effect of the cesarean scar strength on uterine rupture during VBAC remains unclear. It is not known whether repeated vaginal births following cesarean section increase the risk of uterine rupture because of progressive weakening of the scar with each birth, or whether successive deliveries may prove the strength and durability of the scar and predict further successful and less risky vaginal deliveries. This question has not been addressed before.

In order to evaluate the effect of repeated vaginal deliveries on the risk of uterine rupture, we examined the relationship between the number of VBACs and the incidence of uterine rupture among women with uterine scars. The use of oxytocin, prostaglandin-E_2, and instrumental delivery in these cases was also assessed. Clarification of the risk factors for uterine rupture in VBAC may enable timely identification of women at risk during vaginal delivery, and thereby reduce the incidence of this serious complication.

Materials and Methods

In this retrospective study we examined 26 cases of uterine rupture in VBAC recorded between 1980 and 1997 in the Department of Obstetrics and Gynecology at Hadassah University Hospital, Mt. Scopus. These women were matched with 66 delivery controls who achieved VBAC without rupture. The controls were randomly selected using systematic sampling: namely 1 of 250 deliveries recorded in

VBAC = vaginal birth after cesarean section
PGE_2 = prostaglandin-estradiol

the same department over the same period, yielding 209 women of 53,909 deliveries. Of these 209 women, 66 laboring women delivering vaginally following cesarean delivery were selected as matching the study group for age, parity and gravidity. Excluded were women who had trials of labor ending in cesarean delivery, or following two previous cesarean sections, twin deliveries, and those with various obstetric complications unrelated to uterine rupture. The obstetric histories of both groups were investigated, and demographic data, pregnancy, labor and delivery records, as well as neonatal outcome, were obtained from patients' records.

Statistical comparisons between the groups were carried out using the Chi-square test or the Fisher exact test. The Mann-Whitney Wilcoxon test was used to compare groups comprising small numbers.

Results

During the study period 1980–1997, 53,909 deliveries including 4,367 VBACs were recorded at Hadassah Hospital, Mt. Scopus. Among these were 40 cases of uterine rupture. Rupture never occurred in a first birth. Twenty-six of the 40 cases (65%) were VBAC deliveries, comprising 0.59% uterine rupture among VBACs and 0.028% among non-VBACs. Neonatal outcome in both groups was similar, and no fetal death complicated delivery in either group.

Of the VBACs complicated with uterine rupture, 21 were first VBACs. The risk of rupture decreases dramatically in later VBACs: only three cases occurred during the second VBAC, and two during the third and fourth VBACs [Figure 1]. In 15 of the 26 cases the cesarean section had been performed during the women's first birth, thus the birth complicated by rupture was the first vaginal delivery these women had experienced.

There were 4,367 VBACs during the study period, comprising 8.1% of total deliveries (range 7.8–8.7%). The incidence of VBACs during this period showed a constant distribution among first to fourth VBACs: 8.7% of deliveries were first VBACs, 7.8% were second VBACs, 8.1% were third, and 8.6% were fourth VBACs. The incidence of uterine rupture in the first VBAC was 1.6% of all first VBACs, and was significantly higher than the incidence of rupture found in the second VBAC (0.3%), third VBAC (0.2%), and fourth VBAC (0.35%); $P<0.01$.

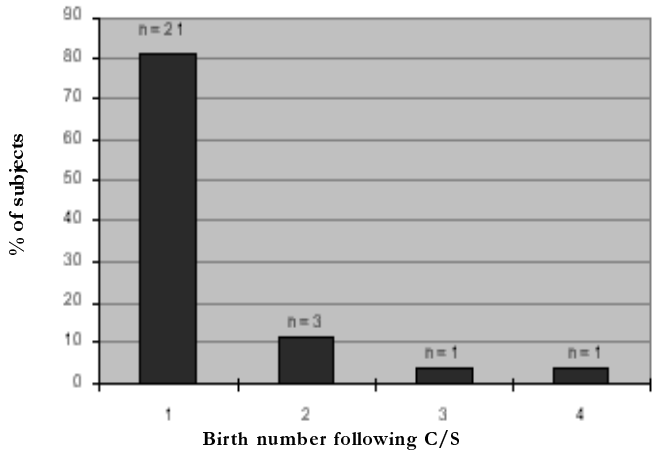

Figure 1. Distribution of uterine rupture with a previous uterine scar according to birth number. The risk falls dramatically after the first successful VBAC.

Table I. Management of labor in rupture and control groups

	VBAC with rupture	VBAC controls	*P*
No. of births	26	66	
Oxytocin use	15 (57.7%)	17 (25.8%)	<0.003
PGE_2 use	7 (26.9%)	4 (6.1%)	<0.01
Instrumental deliveries	8 (30.8%)	2 (3%)	<0.001

PGE_2, instrumental deliveries, and oxytocin were found to have been used significantly more often during deliveries complicated with rupture than in the VBAC controls. Table I presents the breakdown of these factors.

Discussion

Uterine rupture occurs in 0.2–0.7% of births and is associated with significant maternal and fetal morbidity and mortality [1–3]. This complication may be avoided by identifying both the possible causes of uterine rupture and the women who are at increased risk. Safe management of labor and timely diagnosis and treatment of rupture may reduce the incidence and severity of complications.

Uterine rupture occurred in 0.07% of all births in our study, a much lower rate than reported elsewhere [3,11]. This can be attributed to the low risk population and low rate of cesarean sections performed in our department (13–15%). However, the incidence of uterine rupture among VBACs was 0.59%, and while this rate is higher than reported in other studies [3,18,19] it is lower than that reported in some large studies [20–23] covering a similar range. Twenty-six of all cases of rupture (65%) occurred after a previous cesarean delivery. This concurs with many earlier reports that the presence of a cesarean or other uterine scar is one of the major causes of uterine rupture [1,2]. Indeed, Plauche and von Almen [24] regard the risk of rupture as eight times higher in women who have undergone previous uterine surgery.

Of the 26 women who experienced uterine rupture during VBAC, 81% developed the complication during their first VBAC. Only five cases occurred in the second to fourth VBAC. The fact that the rate of VBAC was constant during the first through fourth VBAC, that the number of VBACs did not decrease with further vaginal delivery after cesarean section, and that uterine rupture did occur significantly more often during the first VBAC, reinforce the conclusion that the first vaginal birth after cesarean is the true test of the durability of the uterine scar. A limitation of our study stems

from the fact that the control group was inherently dependent on the occurrence of VBACs. Only women who achieve their first VBAC can experience a second, or third, or fourth. However, since most cases of VBAC-related rupture occurred during the first VBAC, this limitation has no real effect on the significance of our finding.

Our results thus show that the first VBAC represents a situation of high risk for rupture. Further, once a woman has achieved VBAC, the risk of rupture in future deliveries falls dramatically. Our results also confirm that the use of oxytocin, PGE_2 and instrumental interventions were associated more commonly with cases of rupture in the presence of a uterine scar. There was a greater use of these interventions in VBACs complicated with rupture. However, their use may be the result of complicated labors rather than the cause of uterine rupture. Since the rate of spontaneous uterine rupture increases in multiparas, the use of oxytocin, PGE_2 and instumental delivery should be carefully considered in *all* cases of VBAC.

Conclusions

It is known that the presence of a uterine scar is clearly the greatest risk factor for uterine rupture. The risk is greatest in the first vaginal birth after cesarean section and diminishes considerably in subsequent vaginal deliveries. A successful first VBAC most accurately predicts decreased future risk since the greatest potential risk lies in the first VBAC. Caution should be exerted regarding the use of oxytocin, PGE_2, and instrumental delivery techniques.

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An excellent plumber is infinitely more admirable than an incompetent philosopher. The society that scorns excellence in plumbing because plumbing is a humble activity and tolerates shoddiness in philosophy because it is an exalted activity will have neither good plumbing nor good philosophy. Neither its pipes nor its theories will hold water.

John W. Gardner, American government official, (1912–)