OBSTETRICS

Risk of uterine rupture among women attempting vaginal birth after cesarean with an unknown uterine scar

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OBJECTIVE: The purpose of this study was to estimate the association of uterine rupture and previous incision type, either unknown or low transverse, among women who attempt a trial of labor after 1 previous cesarean delivery.

STUDY DESIGN: We conducted a secondary analysis of a prospective multicenter observational study of 15,519 women with term singletons who attempted a trial of labor after 1 previous cesarean delivery. Odds ratios for the association between uterine incision location, either unknown or low transverse, and uterine rupture were estimated with the use of multivariable logistic regression.

RESULTS: Between 1999 and 2002, 99 of the 15,519 women (0.64%) who attempted a trial of labor after 1 previous cesarean delivery experienced a uterine rupture. Pregnant women with an unknown scar had lower odds of uterine rupture (adjusted odds ratio, 0.71; 95% confidence interval, 0.37−1.37) compared with women with a known low transverse scar. Other adverse maternal outcomes did not differ between the 2 groups of women.

CONCLUSION: Among this cohort, women with an unknown uterine incision who attempted a trial of labor were not at increased risk of uterine rupture compared with women with a known low transverse incision.

Key words: trial of labor, unknown scar, uterine rupture, vaginal birth after cesarean delivery

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Cesarean delivery is the most common surgery performed among women in the United States, and approximately one-third of cesarean deliveries are repeat operations.[1] The American Congress of Obstetricians and Gynecologists recommends that women with 1 previous low transverse cesarean delivery should be counseled and offered a trial of labor after cesarean delivery (TOLAC) because of the increasing morbidity that is associated with multiple cesarean deliveries.[2,3]

Uterine rupture is one of the most devastating complications of attempting a TOLAC, and the risk varies based on the location of the uterine incision. The risk of rupture is lowest among women with a previous low transverse uterine incision, with estimates that range from 0.7−0.9%, and increases with a previous fundal incision (1-2% with previous low vertical incision and up to 12% with previous classic incision).[4-7] Given the potential for life-threatening complications, researchers have studied populations and conditions that make TOLAC a reasonable option. The risk of rupture among women with an unknown uterine scar is less understood. Previous studies have examined the association between rupture and incision type but have been limited by small sample size and retrospective study design.[8-10]

Our objective was to estimate the association between risk of uterine rupture and incision type, either unknown or low transverse incision, among a large cohort of women who attempted a trial of labor after 1 previous cesarean delivery.

Materials and Methods

We performed a secondary analysis of the Cesarean Registry, a prospective, observational study of pregnant women with previous cesarean deliveries who delivered at 19 academic medical centers that belonged to the National Institute of Child Health and Human Development Maternal Fetal Medicine Units Network between 1999 and 2002.[4] The

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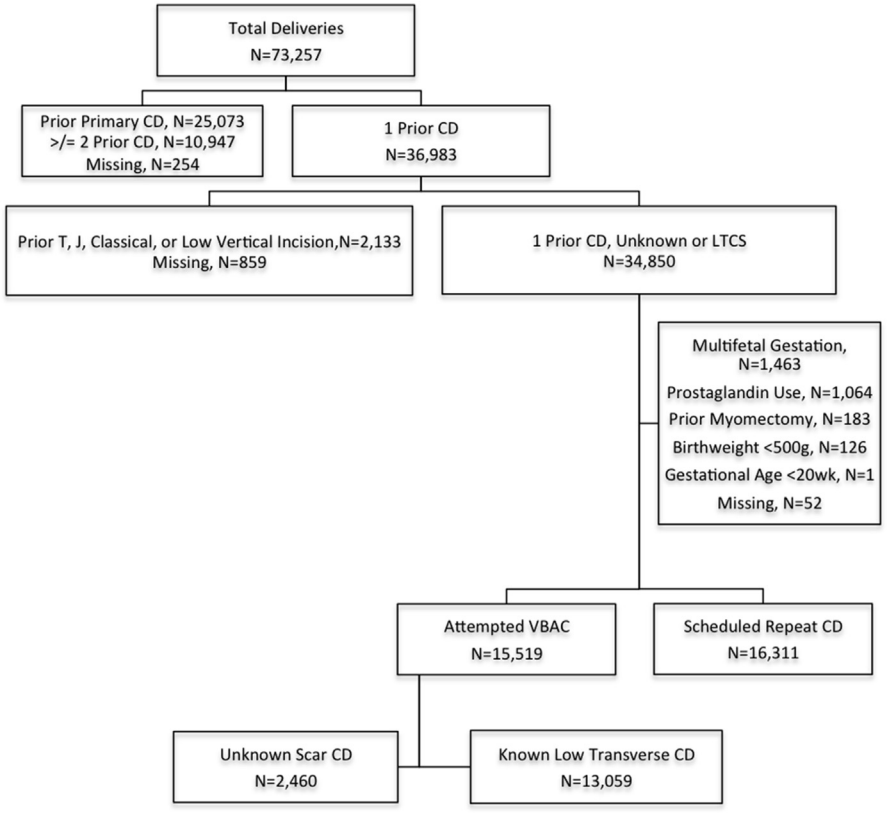
goal of the primary study was to assess maternal and neonatal morbidities that were associated with trial of labor compared with repeat cesarean delivery. This secondary analysis was reviewed and determined exempt by the University of North Carolina institutional review board.

Of the 73,257 women who are enrolled in the Cesarean Registry, we identified 15,519 women with 1 previous cesarean delivery who had either a previous low transverse or unknown uterine scar, delivered at >20 weeks' gestation, and attempted a TOLAC (Figure). Patients were enrolled in the study through identification with the use of the labor and delivery logbook or database at each center.[4] The decision to attempt a TOLAC or schedule a repeat cesarean delivery was determined by the provider and patient. Regardless of the intended mode of delivery, any woman presenting in labor with at least 4-cm cervical dilation and/or receiving oxytocin at any time was categorized as attempting a TOLAC. Exclusion criteria included previous classic, low vertical, or T or J incision, multifetal gestation, previous myomectomy, any prostaglandin use, and birthweight <500 g. Records were excluded from the analysis if information for either inclusion or exclusion criteria was missing.

Demographic information, obstetric and medical history, and intrapartum events were obtained from the medical records by trained study nurses.[4] We evaluated each variable for missing data and excluded any variable with >10% missing information. Neonatal data were abstracted up to 120 days after delivery or at the time of discharge.[4] *Uterine rupture* was defined as a disruption or tear of the uterine muscle and visceral peritoneum or a separation of the uterine muscle with extension to the bladder or broad ligament.[4] The orientation of the uterine rupture was not documented. *Uterine dehiscence* was defined as a disruption of the uterine muscle with intact serosa.[4]

FIGURE
Patient selection flowchart



CD, cesarean delivery; *LTCS*, low transverse cesarean section; *VBAC*, vaginal birth after cesarean delivery.

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Statistical analysis

Participant characteristics were compared by incision type with χ^2 test or Fisher exact tests to evaluate differences for categoric variables and *t* tests to evaluate differences for continuous variables. Multivariable logistic regression was used to estimate odds ratios for the association between incision type and uterine rupture. Estimates were adjusted for potential confounders and covariates that were identified a priori from the literature as being associated with incision type and uterine rupture, which included previous vaginal delivery or vaginal birth after cesarean delivery (VBAC), interdelivery interval, cervical dilation on admission, induced or spontaneous labor, intrauterine pressure catheter placement, epidural use, gestational age, and birthweight. Covariates were removed from the model with backward stepwise elimination and remained if the odds ratio varied by ≥10%. Maternal and neonatal outcomes were compared between women with a previous low transverse incision and women with an unknown uterine incision. Data were analyzed with SAS software (version 12.0; SAS Institute, Inc, Cary, NC).

RESULTS

A total of 15,519 women attempted a TOLAC, of whom 2460 women (15.9%) had a previous unknown uterine scar, and 13,059 women (84.1%) had a previous low transverse scar (Figure). Compared with women with a previous low transverse scar, women with an unknown uterine scar were less likely to be married, to smoke, to be obese, to be enrolled in prenatal care, or to have insurance at delivery ($P \leq .01$ for all associations; Table 1). A higher proportion of Hispanic women had a previous unknown scar. Women with an unknown uterine scar were also more likely to be enrolled in spontaneous labor and to