OBSTETRICS

How do good candidates for trial of labor after cesarean (TOLAC) who undergo elective repeat cesarean differ from those who choose TOLAC?

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OBJECTIVE: Our aim was to compare good candidates for trial of labor after cesarean (TOLAC) who underwent repeat cesarean to those who chose TOLAC.

STUDY DESIGN: Data for all deliveries at 14 regional hospitals over an 8-year period were reviewed. Women with a primary cesarean and 1 subsequent delivery in the dataset were included. The choice of elective repeat cesarean vs TOLAC was assessed in the first delivery following the primary cesarean. Women with ≥70% chance of successful vaginal birth after cesarean as calculated by a published nomogram were considered good candidates for TOLAC. Good candidates who chose an elective repeat cesarean were compared to those who chose TOLAC. Women who were delivered at 2 preselected tertiary centers by a general obstetrician-gynecologist practice were subanalyzed to determine whether there was an effect of physician group.

RESULTS: In all, 5445 women had a primary cesarean and a subsequent delivery. A total of 3120 women were calculated to be good TOLAC candidates. Of this group, 925 (29.7%) chose TOLAC. Women managed by a family practitioner or who were obese were less likely to choose TOLAC while women who were managed by a midwife or had a prior vaginal delivery were more likely to choose TOLAC. At the 2 tertiary centers, 1 general obstetrician-gynecologist group had significantly more patients who chose TOLAC compared to the other obstetrician-gynecologist physician groups ($P < .001$), with 63% of their patients choosing TOLAC.

CONCLUSION: Less than one-third of the good candidates for TOLAC chose TOLAC. Managing provider influences this decision.

Key words: cesarean, patient characteristics, trial of labor after cesarean section, vaginal birth after cesarean

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Over the past 20 years, the rate of vaginal birth after cesarean (VBAC) has continued to decline. The rate of attempted VBAC in the United States decreased from approximately 28% in 1996 to 8% in 2006.[1,2] The most recent Practice Bulletin from the American College of Obstetricians and Gynecologists on VBAC recommends that trial of labor after cesarean (TOLAC) be offered to most women with a history of 1 prior low transverse cesarean delivery.[3] However, there are barriers to offering and acceptance of TOLAC including patient preference, a lack of facilities that offer TOLAC, and unwillingness of physicians to offer TOLAC due to concerns regarding liability.[3]

Women who have a successful VBAC are less likely to suffer morbidity than women undergoing an elective repeat cesarean. However, women undergoing elective repeat cesarean have lower morbidity rates than those undergoing an intrapartum repeat cesarean for failed TOLAC. Prediction models have therefore been developed to identify women who are good candidates for TOLAC based on demographic characteristics that have been associated with successful VBAC.[4-12] These models are intended for physician use in counseling women with a history of cesarean regarding their likelihood of successful VBAC. However, the characteristics of women who are calculated to be good candidates for TOLAC but ultimately undergo elective repeat cesarean have not been investigated. We sought to determine if there are certain demographic characteristics, or individual physicians, associated with an increased likelihood of a patient choosing to have an elective repeat cesarean among women who have ≥70% chance of successful VBAC.

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MATERIALS AND METHODS

This was a retrospective cohort study of all women delivering a singleton pregnancy at 14 Intermountain Healthcare hospitals from July 2000 through July 2008. Patients who had a primary cesarean delivery and their subsequent delivery in one of our facilities were included. Only the delivery immediately following the primary cesarean was used for analysis. Women with an anomalous fetus or stillbirth were excluded. Women who underwent a tubal ligation at the time of their repeat cesarean were also excluded from the analysis as their desire for permanent sterilization likely greatly influenced their mode of delivery.

The nomogram published by Grobman et al[4] for use at the first prenatal visit to predict the likelihood of successful VBAC was then utilized to select women who would have been considered good candidates for TOLAC. Women who were calculated to have a likelihood of successful VBAC ≥70% were included in the final study population. This cutoff was thought to be a clinically useful level at which patients would have a high likelihood of success and was selected a priori.

Resident physicians assisted with the cesareans and were involved with labor management at 2 of the sites, but did not provide counseling regarding the mode of delivery. The study size was dictated by the available cohort for the years of collected data. This study was approved by the Intermountain Healthcare Institutional Review Board.

Women who were good candidates for TOLAC who had an elective repeat cesarean were compared to women electing TOLAC. Those with a failed TOLAC were considered in the same group as women with a successful VBAC for the purposes of this analysis. TOLAC patients were identified as such by having a patient TOLAC request documented by the labor and delivery nurse at admission, the use of oxytocin, intrauterine pressure catheter placement, vaginal delivery, arrest of dilation or descent as the indication for a second cesarean, or a billing code for failed TOLAC. All other women were classified as an elective repeat cesarean. To evaluate whether women were classified appropriately (TOLAC or elective repeat cesarean), 10% of the charts were chosen randomly and assessed by manual chart review.

Demographic and obstetric data were abstracted from the participants' electronic medical records. Recorded demographic variables included maternal age, parity, self-reported race, marital status, prepregnancy body mass index, history of vaginal birth, indication for primary cesarean, and insurance status.

Women who chose an elective repeat cesarean were compared to those who chose TOLAC. Given that patients were nested, or clustered, within hospital, for univariate comparisons of the 2 groups, a mixed-effects logistic regression was used for binary categorical variables, and a mixed-effects multinomial regression was used for unordered categorical variables with ≥3 categories. This mixed-effects approach was utilized to account for the potential lack of independence between study subjects delivered at the same hospital. Variables that have previously been identified to be predictive of successful VBAC were candidates for inclusion in the multivariable model.[4-12] These included: provider type (family practice, maternal-fetal medicine, general obstetrician-gynecologist, or certified nurse midwife), self-reported race, payer status (Medicaid, private insurance, or uninsured), marital status, maternal age >35 years, recurrent indication for primary cesarean (defined as arrest of dilation or descent), history of a vaginal delivery, and obesity. Obesity was defined according to the Institute of Medicine guidelines as a body mass index ≥30.[13]

Using interactive backwards elimination variable selection, a mixed-effects multivariable logistic regression model was then used to determine which variables were independently associated with a decision to have an elective repeat cesarean. In the mixed-effects model, patients were nested within facility. Variables included in the initial model, before backwards variable selection, were the variables found to be different between groups in univariate analysis with a $P < .20$.

Women who were delivered at 2 preselected tertiary centers by a general obstetrician-gynecologist practice were subanalyzed to determine whether there was an effect of physician group. These hospitals were selected because they have a close geographic proximity and presumably draw from a similar patient population. Of note, these data regarding managing provider were only available for the last 3 years of the dataset (from August 2005 through July 2008). Women with missing data for delivering provider (ie, delivered prior to August 2005) were excluded from this portion of the analysis. If a general obstetrician-gynecologist practice delivered <5 women in the allotted time period, they were excluded from the analysis. All patients delivered by a perinatologist, certified nurse midwife, or family practitioner were also excluded from this portion of the analysis. A comparison was made between each general obstetrician-gynecologist practice and the remainder of the groups as a set using a χ^2 test. A mixed-effects approach was not needed for this analysis, as the providers were from different hospitals and so the hospital effect was essentially modeled by the provider variable in the χ^2 analysis. The reported P values were then adjusted for multiple comparisons using the Hochberg procedure.[14,15]

A 2-sided P value $< .05$ was defined as statistically significant. The statistical software package STATA 11.0 (StataCorp, College Station, TX) was used for all analyses.

RESULTS

There were 227,615 singleton nonanomalous live births over the 8-year study period (Figure). A total of 5445 women had a primary cesarean and a subsequent delivery. Of these, 503 women had a bilateral tubal ligation at the time of cesarean and were excluded. The remaining 4942 women met inclusion criteria. Of these women, 3120 (63.1%) were calculated to be good TOLAC candidates (≥70% likelihood of success based on VBAC nomogram by Grobman et al[4]) in their delivery immediately following