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Lifetime Cost-Effectiveness of Trial of Labor After Cesarean in the United States

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ABSTRACT

Objective: To estimate the cost-effectiveness of a trial of labor after one previous cesarean (TOLAC) when incorporating long-term events and outcomes. **Methods:** A Markov model comparing TOLAC with elective repeat cesarean delivery (ERCD) was developed for a hypothetical cohort with no contraindication to a TOLAC. Women were selected from a prospective study to derive probability estimates for potential events through three subsequent pregnancies. Probabilities for cerebral palsy and stress urinary incontinence, cost data, and quality-adjusted life-years (QALYs) were obtained from the literature. The primary outcome was cost-effectiveness measured as the marginal cost per QALY gained, with a $50,000 threshold per QALY used to define cost-effectiveness. **Results:** The TOLAC strategy dominated the ERCD strategy at baseline, with $164.2 million saved and 500 QALYs gained per 100,000 women. The model was sensitive to six variables: the probability of uterine rupture and successful TOLAC among women with no prior vaginal delivery, the frequency of stress urinary incontinence, and the costs of failed TOLAC, successful TOLAC, and ERCD. When the probability of TOLAC success was at the base value, 67.2%, TOLAC was preferred if the probability of uterine rupture was 3.1% or less. When the probability of uterine rupture was at the base value, 0.8%, the TOLAC strategy was preferred as long as the probability of success was 47.2% or more. Probabilistic sensitivity analysis confirmed the base-case analysis. **Conclusions:** Under baseline circumstances, TOLAC is less expensive and more effective than an ERCD when considering long-term consequences when the likelihood of success is 47.2% or more.

Keywords: accreta, cost-effectiveness, elective repeat, trial of labor.

Introduction

In the United States, approximately 1 out of every 5 women, or almost 300,000 women per year, planning the delivery of her second child has had a prior cesarean delivery and is therefore faced with the choice of whether to attempt a trial of labor [1,2]. The ramifications of this decision on maternal and infant outcomes have been reviewed in several articles and summarized in the Agency for Healthcare Research and Quality (AHRQ) evidence report and technology assessment, which concluded that "vaginal birth after a previous cesarean is a reasonable and safe choice for the majority of women with prior cesarean" [3]. To adequately counsel women, both the short-term and the long-term maternal and infant effects of this decision must be considered. The downstream effects include not only adverse perinatal outcomes from the index delivery, such as cerebral palsy (CP), but adverse outcomes in future pregnancies, such as placenta previa and accreta.

Previous decision analyses have compared trial of labor after a previous cesarean (TOLAC) with elective repeat cesarean delivery (ERCD), but these have been limited in their inclusion of inputs and the incorporation of long-term health consequences related to the initial delivery approach [4–8]. For example, three analyses provided the outcome of the initial decision without considering further pregnancies [4–6], and another did not take into consideration patient preferences [7]. A decision model comparing these

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two delivery strategies estimated the probabilities of maternal consequences throughout reproductive life, but did not include costs, preferences, or infant outcomes [8].

The present cost-effectiveness analysis was undertaken to incorporate relevant long-term outcomes and to determine the future health and economic consequences of choosing a TOLAC as opposed to an ERCD among women with one previous cesarean.

Methods

We developed a decision analytic model comparing a TOLAC with an ERCD for a hypothetical cohort of 100,000 women who had no contraindication to a TOLAC and whose only previous delivery was through a low transverse cesarean incision. To model downstream effects from this initial decision, a Markov model was developed to account for potential events related to this initial choice throughout a woman's life. This analysis was based on the societal perspective, incorporating all health outcomes and economic costs regardless of who experienced the outcome or paid the costs [9]. The primary outcome was cost-effectiveness, measured as the marginal cost per quality-adjusted life-year (QALY) gained, with a marginal cost per QALY ratio of less than $50,000 (a frequently used threshold in the United States) used to define cost-effectiveness [10].

The decision tree was developed by using TreeAge Pro 2012 (TreeAge Software, Inc., Williamstown, MA). Probabilities for the decision tree were obtained primarily from data collected from 1999 through 2002 in a registry (the Cesarean Registry) by institutions of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Nineteen clinical centers throughout the United States participated in this observational study, in which data were collected on all women with a prior cesarean delivery. The study was approved by the institutional review board of each participating center where study personnel abstracted data from patient charts under a waiver of informed consent. Further detail on the Cesarean Registry can be obtained from previously published articles [11,12].

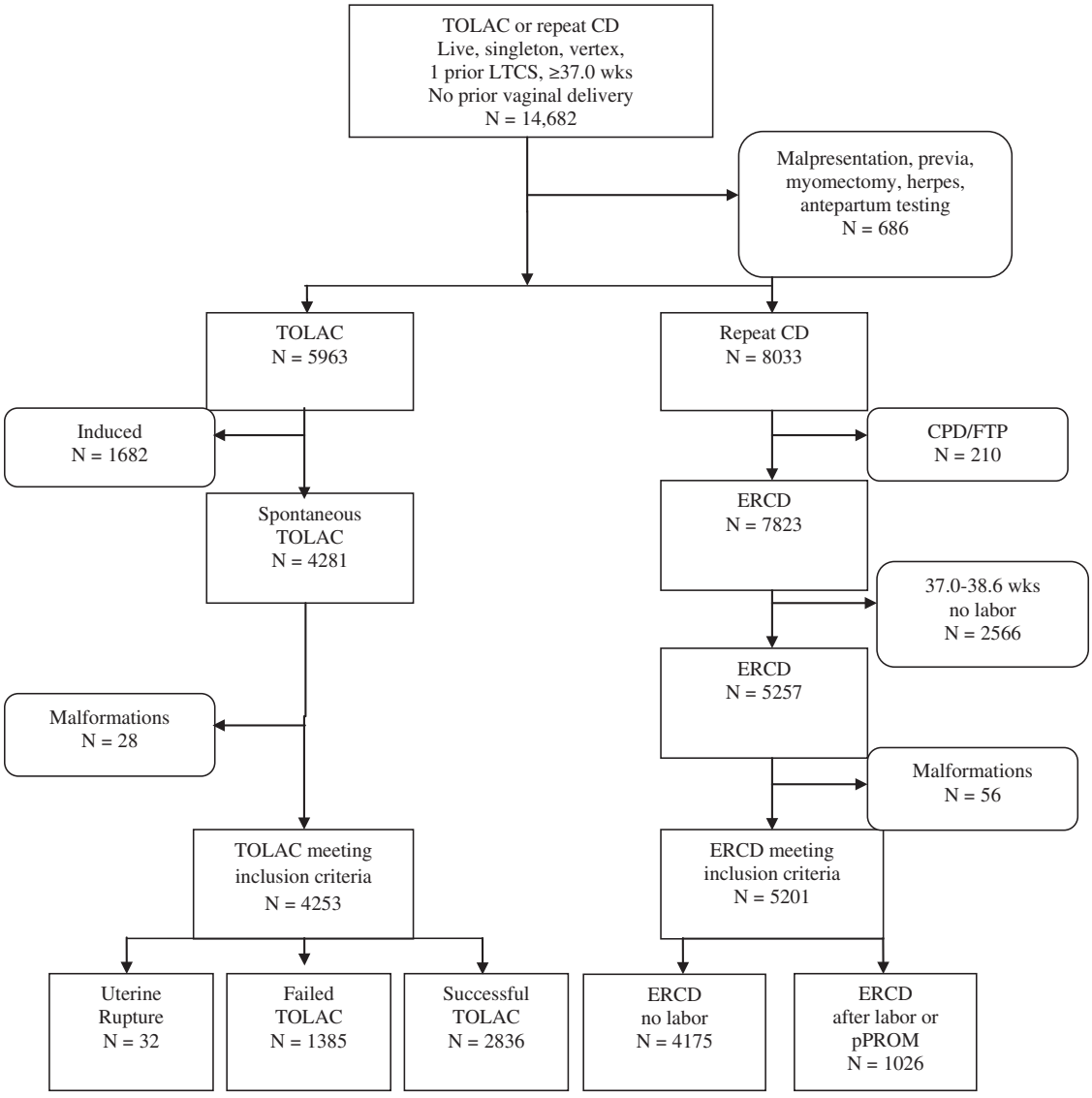

Fig. 1 – Flowchart illustrates the development of the index pregnancy study groups. CD, cesarean delivery; CPD, cephalopelvic disproportion; ERCD, elective repeat cesarean delivery; FTP, failure to progress; LTCS, low-transverse cesarean section; pPROM, premature rupture of the membranes; TOLAC, trial of labor after a previous cesarean.