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Induction of labor in women with a prior cesarean delivery

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ABSTRACT

Given the historically high rates of cesarean delivery in the United States, obstetrical providers must often consider an induction of labor for women with a history of prior cesarean delivery versus repeat cesarean delivery. Clinical evaluation of this scenario involves weighing the benefits of a successful trial of labor after cesarean delivery against the risks associated with symptomatic uterine rupture. This article will review the uncommon but clinically important circumstance of labor induction following a cesarean delivery, including method of induction as well as induction in the setting of second trimester still birth and fetal anomalies.

Introduction

Given the historically high rates of cesarean delivery in the United States,[1] obstetrical providers must often consider an induction of labor for women with a history of prior cesarean delivery versus a repeat cesarean delivery. Clinical evaluation of this scenario involves weighing the benefits of a successful trial of labor after cesarean delivery (TOLAC) against the risks associated with symptomatic uterine rupture. These risks include: transfusion, hysterectomy, fetal hypoxic ischemic encephalopathy, and fetal death.[2] The focus of this review is to explore these risks associated with each method of induction as well as to help providers categorize the likelihood of successful vaginal delivery. In addition, the article will review the uncommon but clinically important circumstance of labor induction following a cesarean delivery in the second trimester in the face of still birth or fetal anomalies.

Trial of labor after cesarean delivery

Eligibility for TOLAC

The initial step in evaluating a woman's eligibility for a trial of labor following a cesarean delivery is to identify conditions that preclude a vaginal delivery. These include placenta or vasa previa, congenital anomalies of the pelvis, and a history of prior uterine rupture among others.[2] Ideal candidates for TOLAC include women with a history of a solitary cesarean delivery by low transverse incision. Controversy exists over whether women with a history of 2 prior low transverse Cesarean deliveries remain appropriate candidates for a trial of labor. Historical data suggests a greater incidence of uterine rupture among women with 2 prior low transverse cesarean deliveries[3] when compared with women with a single low transverse cesarean section. These reports, however, are readily criticized for their small numbers and heterogeneity in methodology. On this topic, 2 large case series found differing results. A 2006 study by Landon et al. found no difference in the rate of uterine rupture when comparing women with a history of 1 versus 2 low transverse incisions (0.9% single cesarean delivery versus 0.7% multiple cesarean deliveries; LANDON SPONG 2006). In contrast, Macones et al.[4] found that women who had 2 cesarean deliveries had an increased risk of complications compared with those who had only 1 cesarean delivery (OR = 2.26). Data of women attempting TOLAC following 2 cesarean deliveries is limited and therefore is discouraged.

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Counseling regarding success

Assuming that a woman is an appropriate candidate for TOLAC, the success of the woman to achieve a vaginal delivery must be weighed against the risks of a TOLAC. Several authors note that the benefits of a TOLAC exceeds the risks of a repeat planned cesarean delivery only when a woman's probability of delivering vaginally exceeds 60–70%.[2] Nonetheless, absolute success rates stratifying appropriate candidates for TOLAC do not exist. Therefore each woman must be individually counseled. Variables known to predict a woman's ability to successfully undergo TOLAC include a history of prior vaginal delivery, the indication for prior cesarean delivery, body mass index, ethnicity, and age. Individual patient success rates can be provided to women using the MFMU's VBAC calculator (https://mfmu.bsc.gwu.edu/PublicBSC/MFMU/VGBirthCalc/vagbirth.html).

Induction of labor without cervical ripening

Consideration of labor induction for both maternal and fetal indications is broadly permitted under current guidelines from multiple obstetrical societies.[5] In consideration of labor induction one must reconsider the impact that labor induction has on the likelihood of delivering vaginally and its potential impact on the rate of uterine rupture. Women considering induction must be counseled regarding the diminished success of vaginal birth associated with induction of labor. Retrospective studies consistently demonstrate a higher rate of cesarean delivery following induction of labor.[6,7]

Some authors have suggested that the risk of induction may be misstated as the majority of trials compare women who are induced versus those who enter spontaneous labor. The reality is that many women who may be planning on spontaneous labor will medically require induction and thus the comparison groups are not appropriate.[8] The limited randomized trials of labor induction versus expectant have failed to show an increase in the rate of cesarean delivery.[9]

Augmentation of labor in women with a history of prior cesarean section

Few articles have examined the risks associated with augmentation in women undergoing a TOLAC in a consistent fashion. Recommendations regarding the risk of uterine rupture associated with Pitocin augmentation largely originate from a single prospective observational trial published by the MFMU. In this study of 17,898 women undergoing TOLAC, 6009 received augmentation. In these women, a relative risk of uterine rupture equal to 2.42 was noted (95% CI: 1.49–3.93) when compared with women who had spontaneous labor without augmentation.[10] In a secondary analysis of this trial, Pitocin augmentation following cesarean delivery was evaluated in women with and without a history of prior vaginal delivery. Interestingly, the relative risk remained statistically significant among women who never had a vaginal delivery while the risk was not increased among women who had delivered vaginally (no prior vaginal delivery 1.5% versus prior vaginal delivery 0.8%, $p = 0.02$).[11]

Induction with Pitocin

Similar concerns exist for women with a history of prior cesarean section undergoing induction of labor. Several studies demonstrate an increased risk of uterine rupture in women undergoing induction of labor. In a retrospective cohort study published by MFMU involving 17,898 women, induction of labor with Pitocin was associated with a 2.86-fold (95% CI: 1.75–4.67) increase in the risk of uterine rupture. Nonetheless, the overall risk was noted to be low at 1.1%.[10] In a smaller study published by Zelop involving 2774 women, induction of labor with Pitocin was associated with a 4.6-fold risk of uterine rupture (OR = 4.6, 95% CI: 1.5–14.1).[12] In contrast, a study published by Lydon-Rochelle, who examined the Washington State Birth Events Record Database, found no increased risk of uterine rupture among 20,095 women whose labors began with a Pitocin induction. The results were similar to those of Ravasia, who found no increase in the rate of uterine rupture among his cohort of 21,119 women who underwent a trial of labor after cesarean delivery.[13] Regardless of whether it is used for induction or augmentation, it is interesting to note that Cahill et al.[14] found a dose–response effect in women who received Pitocin during a TOLAC.

Induction with prostaglandins

Historically, providers have been cautioned about the use of prostaglandins as cervical ripening agents in women with a history of prior cesarean section. The evidence discouraging this practice originates from a small clinical trial in which 2 of 17 women receiving misoprostol experienced uterine rupture.[15] Echoing this concern was a study published by Lydon-Rochelle. Of the 1960 women receiving prostaglandins for labor induction, the relative risk of experiencing uterine rupture was noted to be 15.6 (95% CI: 8.1–30.0, patients with no labor 1.0).[16] Similarly, in a article comparing women attempting TOLAC by induction of labor with prostaglandins versus women experiencing spontaneous onset of labor, women who were provided prostaglandins experienced an increased risk of uterine rupture (OR = 3.95, 95% CI: 2.01–7.79).[17] Given this consistent data, ACOG recommends against the use of prostaglandins for patients with a history of prior cesarean section.[2]

Foley bulb for cervical ripening

In contrast to prostaglandins, data regarding the use of Foley bulbs in patients undergoing a trial of labor after cesarean delivery is comparatively limited. Few articles were identified addressing the topic of induction of labor with Foley bulb in women desiring TOLAC. The majority of articles failed to find any increase in the risk of uterine rupture[13,18–21] while 1 article showed an increased odds ratio of 3.92 (95% CI: 1.78–8.62).[22] The absence of risk associated with Foley bulb induction of labor may be attributed to lower rates of uterine hypertsimulation as proven by several studies.[23] Thus, the safety profile is biologically plausible.