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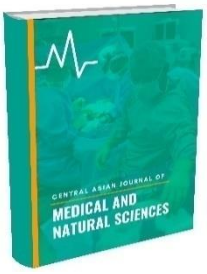

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Use of Labor Induction and Risk of Cesarean Delivery: A Systemic Review and Meta-Analysis

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Annotation: Induction of labor occurs in one out of five pregnancies and may be due to maternal, fetal or elective indications.While induction of labor can reduce maternal and fetal risk in patients with pre-eclampsia or intrauterine growth restriction, it is unclear if induction of labor is associated with an increased rate of cesarean delivery (CD) in these patients, an intervention that carries its own risks .By better understanding the risk of CD after an induction of labor in high-risk patients, clinicians and policymakers can inform future practice and improve patient care. The 'dogma' that induction of labor leads to an increased risk of CD was controversial, and has been recently challenged . A limitation in previous studies was the lack of appropriate control group (spontaneous labor versus expectant management) and confounding factors resulting from indications for induction of labor . There was no increased risk of CD reported after controlling for maternal and fetal indications of induction using multivariate analyses or propensity score matching in cohort and large database studies.

Keywords: labor, pregnancy, patients, cesarean, delivery, maternal, fetal, management.

Introduction

Induction of labor is a common and essential element of the contemporary obstetric practice and now accounts for approximately 20% of all deliveries .Induction of labor is thought to be associated with an increase in the risk of cesarean delivery both for nulliparous and multiparous women .This has been demonstrated both for inductions on medical grounds and for elective inductions . More recent randomized comparisons have demonstrated that the effect of the induction of labor on the risk of cesarean delivery is limited. In postterm women as well as in women with prolonged rupture of membranes at term and in women with hypertensive disease, induction of labor is more effective than expectant management .[1,2]

Data in parous women undergoing labor induction have revealed conflicting results. Some observational studies suggest that the rate of cesarean delivery in multiparous women with an elective

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induction is similar to that in those women with a spontaneous onset of labor . Other studies report an increased risk for those who were electively induced . One recent study even reported a lower cesarean delivery rate in multiparous women in whom labor was induced preventively, in order to ensure that pregnant women entered labor at an optimal time for the mother-baby pair .

Not much is known about factors related to a cesarean delivery after induction of labor in multiparous women.In women where cesarean delivery is required, the procedure not only carries the operative risks in the index pregnancy, but also increases risks for future pregnancies . Consequently, it would be useful to understand which factors are related to a cesarean delivery after induction of labor in multiparous women. [3,4]

Cesarean birth can be life-saving for the fetus, the mother, or both in certain cases. However, the rapid increase in cesarean birth rates from 1996 to 2011 without clear evidence of concomitant decreases in maternal or neonatal morbidity or mortality raises significant concern that cesarean delivery is overused. Variation in the rates of nulliparous, term, singleton, vertex cesarean births also indicates that clinical practice patterns affect the number of cesarean births performed. The most common indications for primary cesarean delivery include, in order of frequency, labor dystocia, abnormal or indeterminate (formerly, nonreassuring) fetal heart rate tracing, fetal malpresentation, multiple gestation, and suspected fetal macrosomia. Safe reduction of the rate of primary cesarean deliveries will require different approaches for each of these, as well as other, indications. For example, it may be necessary to revisit the definition of labor dystocia because recent data show that contemporary labor progresses at a rate substantially slower than what was historically taught. Additionally, improved and standardized fetal heart rate interpretation and management may have an effect. Increasing women's access to nonmedical interventions during labor, such as continuous labor and delivery support, also has been shown to reduce cesarean birth rates. External cephalic version for breech presentation and a trial of labor for women with twin gestations when the first twin is in cephalic presentation are other of several examples of interventions that can contribute to the safe lowering of the primary cesarean delivery rate.[5,6]

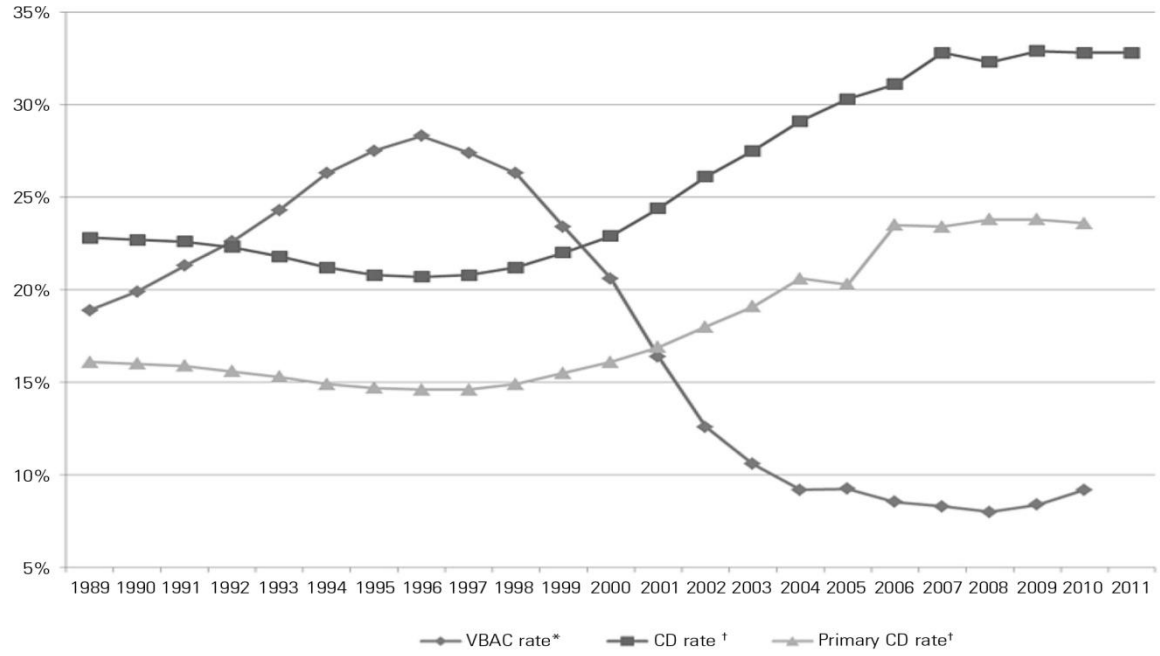

Fig. 1. U.S. delivery rates, 1989–2011. Data from National Vital Statistics. Abbreviations: CD, cesarean delivery; VBAC, vaginal birth after cesarean delivery . *Percent of women who have a vaginal birth after prior cesarean delivery. †Rate based on total number of deliveries. (Data from Martin JA, Hamilton BE, Ventura SJ, Osterman MJ, Mathews TJ. Births: final data for 2011. Natl Vital Stat Rep 2013;62(2):1–90.) ⇦

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Therefore, it is important for health care providers to understand the short-term and long-term tradeoffs between cesarean and vaginal delivery, as well as the safe and appropriate opportunities to prevent overuse of cesarean delivery, particularly primary cesarean delivery.

Discussion

The researchers found that this reduced risk persisted for both high- and low-risk pregnancies, and women who were induced had lower risk of fetal death and other complications, compared with those who underwent expectant management.In addition, the researchers found that women whose labors were induced using Prostaglandin E2 – a drug commonly used in the US and Canada – had a significantly lower risk of cesarean delivery. But use of oxytocin and amniotomy for induced labor was not associated with reduced risk of cesarean.

The researchers say their findings provide a "robust answer to the disputed question of risk of cesarean delivery associated with induction of labour."They note that their study results also have implications for clinical guidelines as well as the clinical practice of obstetrics. "Our findings are important when selecting candidates for labour induction and when advising women on the risks of induction," they add.They conclude that mothers, midwives and obstetricians should be "reassured" by evidence that labor induction may not be as risky as previously thought.This is not the only study quashing past research related to labor induction. Medical News Today recently reported on a committee opinion from the American College of Obstetricians and Gynecologists, which suggested there is insufficient evidence to suggest that labor induction or augmentation causes autism.[7,8]

A cesarean delivery can seriously impact the health of the mother and child, but recent research may have uncovered a way to increase the odds of delivering your child naturally.According to a new study, inducing labor at 39 weeks can significantly reduce the chances of a woman needing a cesarean (C-section) birth.The research from Northwestern University was published last week in the New England Journal of Medicine (NEJM).The study authors said that inducing labor at 39 weeks for first-time mothers can significantly reduce the odds of undergoing this invasive surgery.For this study, researchers tracked more than 6,100 women in 41 sites across the United States.Half of the women were given an elective induction in the week before they were due.The other women were allowed to start labor without any intervention.Researchers said that women induced at 39 weeks experienced fewer cesarean births, lower rates of maternal and fetal complications, fewer newborns needing respiratory support, and reduced incidence of preeclampsia.Dr. John Thoppil of River Place OB-GYN in Austin, Texas, told Healthline he was particularly impressed by how the women who had their labor induced benefited from significantly reduced rates of high blood pressure."The rate of hypertension during pregnancy was just nine percent in the induction group versus 14 percent in the group that was allowed to carry to term. That is really significant," he said.Thoppil explained that high blood pressure during pregnancy "can impact the mother's long-term health by increasing the risk of heart attacks and cardiovascular disease as they get older."[9,10]

Induction of labour indications

Indication	Recommendation
Term PROM - GBS negative or unknown	IOL within 24 hours of confirmed PROM
Term PROM - GBS positive, meconium liquor, suspected sepsis	Immediate IOL
PPROM	<34/40 - expectant management ≥34/40 - consider balance of risks and benefits for woman and baby and availability of resources
Previous caesarean	Individualise management - increased risk of uterine

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	rupture and emergency caesarean
Maternal request	Do not routinely offer IOL for maternal request
Breech presentation	IOL may be offered if clinical circumstances are favourable and the woman wishes to have a vaginal birth
History of precipitate labour	Do not routinely offer IOL for history of precipitate labour
Suspected fetal macrosomia	IOL not indicated for suspected macrosomia
Advanced maternal age (AMA)	IOL not indicated for AMA as an isolated risk factor
BMI ≥50	Delivery is recommended at 38-39 weeks

Nearly one in three women in the United States gives birth by cesarean delivery, according to the Centers for Disease Control and PreventionTrusted Source (CDC).A cesarean delivery is major surgery and can sometimes cause serious complications.Since this procedure involves cutting into the abdomen and uterus to remove the baby, it can take up to six weeks for a woman to fully recover.This can extend her hospital stay by several days or longer if there are complications."Complications of C-section can include infection, blood loss requiring transfusions, and injury to organs near the uterus," Thoppil said.He added that, in rare instances, a C-section can even carry the risk of losing the uterus, causing infertility.[11]

With a cesarean delivery, the baby is not likely to acquire the full complement of the mother's vaginal and gut microbes.According to Thoppil, when a mother gives birth vaginally, the birth fluids pass on colonies of essential microbes to the baby.These bacteria are essential for establishing the colonies of gut bacteria that ensure optimal priming of the child's immune system and good digestive health."We're finding out more and more how important the relationship we have with our microbiome (gut bacteria) is for our long-term health," said Thoppil.The findings of this new study go against previous research that suggested inducing labor before 41 weeks increased the risk of a cesarean delivery and the likelihood of serious complications.Thoppil said this was reflected in his own experiences."Prior to the study, I was getting pushback from hospitals not wanting to allow inductions for purely elective reasons," he said. "There were simply many less inductions being offered."Thoppil added that the main reason was specifically a belief that inducing labor increased the odds of a cesarean birth, something the new research refutes.[12,13]

Results

Although a natural birth is the safest and healthiest option for both mother and baby, it doesn't mean that a cesarean delivery has no role in ensuring a safe delivery.There are instances when a cesarean birth is required to ensure the health of both mother and child.According to the March of Dimes, cases when a cesarean delivery can be needed include:

- previously giving birth by cesarean
- the presence of an infection, such as HIV or genital herpes
- multiple births (twins or more)
- the baby is too large for the birth canal

Thoppil said that his take-home message is that "Although previous data scared expectant mothers away from inducement because they were told it increased the rate of infection and C-section, we now have a very compelling argument to say that it is both safe and reasonable to induce labor."Castor oil, which is a type of induction methods, is routinely offered to women with previous Caesarean delivery who require induction of labor. However, castor oil may not exert its labor induction effect immediately and the delivery may be delayed by up to 8 days. This may render a proportion of women

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resort to repeated Caesarean section for failed induction. Castor oil is traditionally given by midwives in order to induce labor.[14,15]

Contrary to what doctors have thought, women who opt to have their labor induced in the 39th week of pregnancy do not face a heightened risk of cesarean section, a new clinical trial finds.In fact, the study showed, those women were less likely to need a C-section than women who let nature take its course. Elective inductions -- done for personal reasons rather than medical ones -- have become more common in the United States in recent years, according to the U.S. National Institutes of Health.However, medical groups have traditionally cautioned against it. The concern is that the practice could increase the need for an emergency C-section or other delivery complications. (When a labor induction fails, a C-section might be necessary.)

Childbirth is "an incredibly personal experience," said Grobman, an obstetrician at Northwestern University, in Chicago."Women should have accurate information about the benefits and risks of different options for delivery, so they can make informed choices," he explained.A full-term pregnancy lasts about 40 weeks, and babies born during the 39th week are considered full-term. But elective induction at that point in pregnancy has been controversial -- except in special circumstances, such as when a woman lives far from a hospital.They've compared women who had labor inductions with women who went into spontaneous labor at the same point in pregnancy -- and found that C-sections were more common in the induction group.But that's not a realistic comparison, Grobman said. "No one is guaranteed to be laboring on the same day they would've had an induction," he noted.For the study, his team recruited more than 6,100 pregnant women from 41 U.S. hospitals. All were healthy first-time mothers.The women were randomly assigned to either have an induction during their 39th week, or let nature take its course.[16,17]

Women and their doctors chose the induction method: In general, it is done either by rupturing the amniotic sac or with hormonal medications that trigger labor.In the end, the C-section rate was less than 19 percent in the induction group, versus just over 22 percent in the standard-care group, the findings showed.The researchers also looked at newborn complications -- such as breathing problems, seizures and injuries during delivery. That rate was just over 4 percent in the induction group, and just over 5 percent in the comparison group.[18,19]

Conclusions

Greene speculated on one reason: Once a pregnancy has reached full-term, the odds of needing a C-section rise as the days go on. The placenta tends to function less well, Greene explained, and when a woman does go into labor, there can be problems with the baby's oxygen supply. So doctors might end up doing a C-section.In addition, labor induction may be suggested after a woman goes a week beyond her due date."Post-term" births -- beyond week 42 of pregnancy -- carry a slightly higher risk of stillbirth and birth injuries to mother and baby, according to the American College of Obstetricians and Gynecologists.[20,21,22]

Women who have labor induced at week 39 face no risk of post-term delivery, Greene said.Grobman stressed a critical point: If women do consider elective induction, there must be certainty around their due date. This trial included only women who were sure about the date of their last menstrual period, and/or had reliable ultrasound results from the first or second trimesters."This should only be an option for women with absolutely reliable information on gestational age[23,24]

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