# The term breech: vaginal or cesarean delivery?

*The Term Breech Trial has been hailed for shining light on the murky question of how best to deliver term breech infants. But does it really?*

Until Mary E. Hannah and her colleagues conducted the randomized controlled study known as the Term Breech Trial (published in the October 21, 2000, issue of the *Lancet*), data on the best delivery method for breech infants at term were sketchy and conflicting. Still, elective cesarean generally was preferred when the breech presentation was footling; the fetus was large, compromised, or had a congenital abnormality that could complicate vaginal delivery; or when a physician experienced in vaginal breech delivery was unavailable. However, the optimal mode of delivery for all other term breech fetuses remained unclear at best—at worst, controversial.

The Term Breech Trial spanned 26 countries and involved 2,088 women with a frank or complete breech presentation at term (37 weeks and later). Of the 1,041 women allocated to planned cesarean delivery, 941 (90.4%) were delivered by C-section, while 591 of the 1,042 women (56.7%) assigned to the vaginal group were delivered vaginally. An experienced clinician was present during all vaginal deliveries. The primary outcomes analyzed were perinatal or neonatal mortality and serious neonatal morbidity, which were significantly lower for the planned-cesarean group than for the vaginal-delivery group (1.6% versus 5%). For the outcomes of maternal mortality and serious maternal morbidity, there were no real differences between the groups.

Baseline characteristics of the women, infants, hospitals, countries, prenatal care, and

labor were used to group the women different ways to determine whether there was an interaction between a characteristic and the treatment group for the primary outcomes. The only significant interactions involved a country's perinatal mortality rate (PMR), as reported by the World Health Organization (WHO), and serious neonatal morbidity. Specifically, in countries with a low PMR, planned cesarean section had much greater benefits for the infant than in the trial group as a whole. In countries where the PMR is high, the benefits of planned cesarean were much lower than in the entire trial group. Because of this, researchers concluded, as many as 39 additional cesareans might be needed to avoid one infant's serious morbidity or death in countries with a high PMR compared with as few as 7 additional C-sections in countries with a low PMR. For the study group as a whole, 14 additional cesareans would have to be performed to prevent one infant's death or serious morbidity.

Although many clinicians now believe the mode of delivery for term breech infants clearly should be elective cesarean, particularly since the American College of Obstetricians and Gynecologists (ACOG) issued a committee opinion in favor of it in December 2001, that outlook isn't universal. Here, 4 experts weigh in. Favoring elective cesarean is Ellen Mozurkewich, MD, MS. Arguing against relegating vaginal breech delivery to "the shelves of history" are Alex C. Vidaeff, MD, and Edward R. Yeomans, MD. And Martin L. Gimovsky, MD, makes the case for individualizing treatment.

Alex Vidaeff, MD

## Vaginal delivery

*BY ALEX C. VIDAEFF, MD, and EDWARD R. YEOMANS, MD*

Rarely should a single medical article alter the way physicians practice. Even the randomized controlled trial (RCT), the "gold standard" of medical research, is subject to scrutiny. The Term Breech Trial is undoubtedly a remarkable scientific undertaking.[1] The way it was designed and conducted lends substantial weight to its conclusions. But is it such a perfect and convincing work that we can confidently accept it as the "last word" and relegate a whole chapter of practical contemporary obstetrics to the shelves of history? We think not, and we summarize our reasons below.

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Ellen Mozurkewich, MD, MS

## Elective cesarean

*BY ELLEN MOZURKEWICH, MD, MS*

The Term Breech Trial was supposed to be impossible. Before it was undertaken, the National Institute of Child Health and Human Development explored the feasibility of conducting such a trial in the United States and concluded it would not be workable to recruit sufficient numbers of patients in a reasonable amount of time.[1]

But Mary E. Hannah persevered. After a systematic review of the randomized and nonrandomized trials comparing outcomes after breech presentation at term,[2] she and her colleagues hosted a consensus conference of Canadian obstetricians experienced in vaginal breech delivery in order to lay

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## The problem: variability in exposure

Variability in the conduct of vaginal breech delivery (also called "exposure") can produce differences in outcomes and lead to false inferences. Hannah et al attempted to control for the significant differences in practice patterns among operators in the 26 participating countries by stratifying those countries according to their national PMR, creating 2 subgroups: high and low PMR. But this stratification criterion seems arbitrary. For example, we know firsthand that the technical approach to vaginal breech delivery in Romania and the United States, both of which fall into the low-PMR category, is as different as night and day, and we presume that such differences exist between other countries as well—within subgroups. (As an intern, Dr. Vidaeff learned to conduct vaginal breech deliveries in Romania.)

Many foreign practitioners adhere to the principle of noninterference during vaginal breech births until spontaneous delivery of the scapulae occurs (or even later, according to the Vermelin or Burns-Marshall's methods). However, in the United States and Canada, operator intervention begins when the fetus is delivered to the level of the umbilicus.[2] Such technical differences may account for varying outcomes, and no statistical test can tell us which covariates (independent variables) have been omitted or underestimated in the analysis. Further, maneuvers such as the Bracht maneuver, very popular in Europe, are ignored in the United States and Canada, whereas the Piper forceps, frequently used in North America, is unknown in some parts of the world.

The rate of successful vaginal delivery—when attempted—also differs markedly between the subgroups, from 68.3% in countries with high perinatal mortality to 44.7% in those with low perinatal mortality. Two reputable studies have determined the success rate of well-selected breech trials of labor to be around 70%.[3,4] The 56.7% overall success rate in the Term Breech Trial raises questions about eligibility and selection criteria, and also about the variability in operator characteristics.

Another potential source of variability is the use of conduction analgesia in breech trials of labor. Normal, spontaneous progress in the first stage of labor, with optimal maternal expulsive forces and cooperation in the second stage of labor, is highly desirable for vaginal breech delivery. Inefficient maternal pushing in the second stage will expose the fetus to intravaginal manipulations that could jeopardize its well-being.

It appears that—at least in some cases—epidural analgesia has the potential to cause uterine hypocontractility and a prolonged, inefficient second stage of labor. For this reason, some skilled operators believe that epidural analgesia is best avoided in a breech trial of labor.[5] We are not at all surprised that among the women in the Term Breech Trial who were able to deliver vaginally (in the group assigned to vaginal delivery), only 25.1% received epidural analgesia. What we do not understand is why a repeat analysis was performed after excluding the vaginal deliveries that did not involve epidural analgesia. Just the opposite might have been interesting: a repeat analysis after excluding the cases with epidural analgesia! Or, instead of an arbitrary stratification based on national PMR statistics—which might be totally irrelevant for the level of care in the particular institutions selected to participate in the study—stratification based on clinical factors such as the availability and use of epidural analgesia might have been more meaningful.

## The selection process

The development of inclusion criteria was undoubtedly the first step in selecting appropriate candidates for the breech trial of labor. In practice, however, there is a second step in the selection process: the observation of labor abnormalities that might disqualify cases previously considered appropriate. In the Term Breech Trial, this second step was likely highly variable. For many experienced practitioners, conditions such as premature rupture of membranes (PROM), an absence of spontaneous labor, uterine hypocontractility, or an abnormal labor curve would prompt a reconsideration of the mode of delivery. Some experts believe that any arrest of spontaneous progress in labor

necessitates cesarean section.[6] Contrary to that, in the Term Breech Trial, as many as 22.4% of the cases assigned to planned vaginal birth had PROM, an unspecified number were induced, and a significant number of cases had augmented labor. Even Brenner, one of the few authors to conclude that the induction of labor is acceptable for women with breech presentations, noted that labor augmentation is associated with higher rates of infant mortality and morbidity.[7]

The authors conducted another repeat analysis after excluding 335 cases in which labor was induced or augmented, presentation was footling, or supervision was inadequate. These excluded cases, which account for 32% of the total for planned vaginal delivery, were responsible for 55.7% of the total adverse outcomes in that group only. This suggests that poor eligibility criteria may have contributed to an increased risk of fetal injury.

Does the trial reflect the customary clinical approach to breech presentation in labor or, rather, suggest that the operators felt bound by the randomized assignment? Is the higher rate of successful vaginal delivery in countries with high perinatal mortality indicative of greater operator experience with vaginal breech births (as speculated by the authors), or were the operators simply not as quick to resort to cesarean delivery, compared with their counterparts in countries with low perinatal mortality?

## Interpreting outcomes

The authors' interpretation of their results sometimes defies clinical plausibility. For example, in regard to the 16 cases of perinatal mortality, is it conceivable that the neonatal death from possible gastroenteritis in one infant who had been discharged home well, or the sudden infant death syndrome (SIDS) in a low-birth-weight infant also discharged home well, or the neonatal deaths from respiratory problems in possibly premature newborns might be attributed to something other than the mode of delivery? Also included are cases of intrapartum death with "fetal heart tones disappearing before a cesarean section could be done." Such cases could reflect labor management rather than consequences attributable to mode of delivery.

We also are unconvinced by the authors' contention that "the avoidance of labor...could have contributed to better outcomes." The same logic could be extended to any woman in labor—whether presentation is cephalic or breech. An overall policy of planned cesarean section would prevent complications of labor because there would be no labor! Only 3 cases of perinatal death appear to be related to a difficult vaginal breech delivery in the group randomized to planned vaginal birth, equal to the rate of perinatal mortality in the planned-cesarean-delivery group.

The interpretation of cases involving serious neonatal morbidity also appears subjective and speculative. How serious are the 5 cases of brachial plexus injury in the vaginal-delivery group when most were already improving 2 to 4 days after delivery? Further, measures of neonatal morbidity such as the Apgar score are influenced by the subjectivity of unblinded caregivers and rarely signify long-term morbidity. Intracerebral or intraventricular hemorrhage, another measure of neonatal morbidity, also may be unrelated to the mode of delivery,[8] whereas measures of serious neonatal morbidity such as spinal-cord injury or basal skull fracture actually occurred in the planned-cesarean group.

Even if we accept the alarming rates of serious neonatal morbidity presented in the study—1.4% in the planned-cesarean group versus 3.8% in the planned-vaginal-delivery group—the risk differential, also known as the attributable risk (the difference attributable to a trial of labor) is only 2.4%. For practical purposes, this means that among 100 women with breech presentation, a trial of labor is associated with 2 more undesired outcomes on average than if there were no trial of labor. Applying the same reasoning for the 0.2% difference in prolonged NICU admissions, among 1,000 women with breech presentation, a trial of labor is associated with only 2 more prolonged NICU admissions (longer than 4 days) than if there were no trial of labor.

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## The middle road: deciding case by case

**Martin Gimovsky, MD**

While the design of the Term Breech Trial was exceptional and the data it yielded valuable, I do not believe it definitively answered the question of which mode of delivery is best for breech presentations at term—vaginal or cesarean. Rather, I would argue for making that decision on a case-by-case basis.

**The importance of imaging.** Accurate assessments of fetal weight and size and the maternal pelvis are critical. When these measurements cannot be confirmed by sophisticated imaging, i.e., ultrasound, x-ray pelvimetry, computed tomography (CT), or magnetic resonance imaging (MRI), the outcome of vaginal delivery is highly uncertain. No gravida carrying a breech infant should undergo a trial of labor unless such imaging is available. When it is not, I would opt for elective cesarean.

**Maternal versus neonatal morbidity.** We tend to assume that the mother should sustain whatever morbidity is necessary—barring severe injury and death, of course—to ensure the delivery of a healthy infant. Thus, we underestimate the significance of the potential adverse effects of cesarean section: greater blood loss, wound infection or dehiscence, systemic infection, and the need for a vertical or greatly extended transverse uterine incision, not to mention the likelihood that the woman will need to undergo cesarean section at future deliveries. While the health of the infant is extremely important, it does not necessarily have to come at the mother's expense. If a gravida is properly selected, vaginal delivery can protect the health of both mother and child.

**The wishes of the patient.** While a policy of planned cesarean delivery for term breech infants may be advisable in many cases, it overlooks one vital element: the desires of the mother. I believe those wishes should be weighed along with the potential benefits and risks of cesarean section. Several of my patients agreed to participate in the Term Breech Trial until they were randomized to planned cesarean. Because they so strongly desired vaginal delivery, they withdrew from the trial rather than proceed with cesarean section. Of course, I confirmed fetopelvic adequacy and other factors key to successful vaginal delivery using the most sophisticated means. When vaginal delivery appeared feasible, I acquiesced to their wishes.

For many women, the ability to deliver their infant vaginally is extremely important. These women may see cesarean delivery—even in the case of breech presentation—as a loss of involvement in the birth of their child. When facilities are adequate and the physician is experienced in vaginal breech delivery, I believe the patient should be allowed to proceed with vaginal delivery if she chooses, provided it is not contraindicated by other factors.[1]

**Last thoughts.** Cesarean deliveries are breech extractions, with all the attendant risks; one does not bypass the fact of breech presentation by opting for cesarean. An assisted breech delivery can be just as safe—or safer—for both the fetus and mother, provided the patient is properly selected and the physician has the necessary expertise and adequate facilities at his or her disposal. For these reasons, I offer women with breech fetuses at term both options: vaginal and cesarean delivery. The final decision, of course, depends on a number of elements, since the problem of breech presentation is multifactorial.

During my career, I have participated in hundreds of breech deliveries, both by cesarean and vaginally. Although external cephalic version (ECV)—with tocolysis performed either prior to or in early labor—is a satisfactory solution to the malpresentation problem,[2] the selective and safe management of breech labor and delivery is an invaluable addition to the tools available to the accoucheur. (For more details on ECV, see "Achieving version in breech presentations: 3 approaches" on page 33.)

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## Conclusion

Last year at LBJ General Hospital in Houston, we performed 97 vaginal breech deliveries. (The total number of breech deliveries at the institution for the year was 158, a 3% incidence.) Unfortunately, our experience differs dramatically from that of most practitioners, as the number of physicians able to safely vaginally deliver singleton breech fetuses continues to dwindle. In fact, the threat of litigation already may have rendered the mode-of-delivery question moot in the United States. Time and social conditions—not science—have changed the practice of obstetrics.

The questions we should ask ourselves are these: What will happen when a woman with a term breech fetus presents in advanced labor and a cesarean cannot be accomplished expeditiously? It happened in 59 cases in the trial, 5.6% of the planned-cesarean group. And what will happen when none of the attendants of such a patient has ever observed a vaginal breech delivery?

It will be a sad moment in the history of our specialty. We will replace the questionable 3% attributable risk of perinatal mortality or serious neonatal morbidity found in the study (the approximate difference between 5% and 1.6%) with a possible—or even probable—5% risk of major fetal jeopardy! ■

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out guidelines under which a trial of labor might safely be conducted.[3] Participants also reached an agreement on appropriate intrapartum management. These efforts became the backbone of the Term Breech Trial protocol.

Although it was several years in planning, the trial was not without some urgency. As its authors noted in a letter commenting on the feasibility of such a study: "We are concerned that time is running out to answer this question as those who are skilled and experienced in the technique of vaginal breech delivery are leaving clinical obstetric practice."[4]

Like many of the clinicians who participated in the trial, I hoped the study would find no difference in fetal/neonatal outcomes between the 2 modes of delivery. Thus, I was somewhat disappointed when elective cesarean proved to be the safer treatment. Nevertheless, I believe the findings of the trial are highly robust. Any way you look at the data, there is an advantage to planned cesarean delivery.

## The risks of vaginal delivery

The most feared complication of attempted vaginal breech delivery is entrapment of the aftercoming head, which can result from relative fetopelvic disproportion or from nuchal arms. Besides death and serious morbidity such as asphyxial injuries, clavicle fractures, and brachial plexus injuries, spinal cord injuries and maternal genital trauma may result. While these complications also may occur with cesarean delivery, most U.S. and Canadian obstetricians feel that the likelihood of difficult extraction and major trauma is lower with cesarean section. The results of the Term Breech Trial confirm this assumption.

The waning of vaginal breech deliveries in many developed countries (including the United States and Canada) further increases the risks of these births. In a survey of Canadian obstetricians regarding management of breech presentation at term, 69% of respondents felt that Canadian residents-in-training were insufficiently experienced to safely manage a trial of labor and vaginal

delivery for mothers with frank breech presentations at term.[5] The declining numbers of clinicians experienced in vaginal breech delivery also made it necessary for the authors of the Term Breech Trial to include centers from developing countries in order to recruit enough participants. The inclusion of these centers was probably a net strong point, since intended vaginal birth is standard, rather than exceptional, in most developing countries. That is, obstetricians in these countries are probably more experienced in vaginal breech delivery than their counterparts in developed nations.

The fact that elective cesarean failed to reduce neonatal morbidity in countries with a high PMR may have been due to this greater level of experience. However, the perinatal or neonatal mortality rate among women randomized to intended vaginal delivery in these countries was 3 times greater than the perinatal mortality rate among women undergoing elective cesarean section. Thus, it is possible that babies born with problems attributable to intended vaginal birth died—instead of becoming survivors with serious morbidity.

Because the authors of the Term Breech Trial knew that many obstetricians would be disappointed by the findings, they conducted a number of subanalyses. They performed regression analysis looking for significant interactions between the treatment group and a number of factors for the combined outcome of perinatal mortality, neonatal mortality, and serious neonatal morbidity. These factors included parity, type of breech presentation, gestational age, presence of labor, presence of ruptured membranes, estimated fetal weight, method of assessing attitude of the fetal head, and method of assessing pelvic adequacy. They found no significant interaction between the treatment group and these factors. That is, they were unable to identify a subgroup for whom the effect of the 2 treatments on the combined outcome was equivalent.

The authors also analyzed their data according to years of experience of the practitioner present at each vaginal delivery. They found an advantage to the fetus/infant for elective cesarean section even among infants delivered by obstetricians with more than 20 years of experience in vaginal breech delivery. The authors analyzed their data excluding vaginal breech deliveries that occurred after prolonged labor, after induced or augmented labor, deliveries in which a footling or uncertain breech was present, and deliveries in which no skilled clinician was present. They also analyzed their data excluding women having a vaginal breech delivery without epidural anesthetic. They found an advantage to the fetus for cesarean delivery in all the subgroups analyzed.

## Are the results generalizable?

A major question clinicians must address when interpreting the results of any randomized controlled trial (RCT) is whether they are generalizable to the practice of medicine in the clinician's own setting. One concern raised by many RCTs is that conditions in the university hospitals in which most trials are carried out may differ from those in most practice environments. Out of necessity, the Term Breech Trial included a wide variety of community and university settings, as well as more than 2 dozen countries. The authors anticipated the problem of different styles of practice by laying out a very clearly defined study protocol, with strict guidelines for eligibility and intrapartum management drawn from the Canadian consensus conference.[3] In addition, by classifying countries according to the PMR, the authors ensured that the findings would be applicable in both developed and developing nations.

Although it would be beneficial to compare the results of the Term Breech Trial with those of future multicenter RCTs on the subject, the Term Breech Trial yields solid data. And since the number of obstetricians experienced in vaginal breech delivery continues to decline in the developed world, this trial is likely to be the only large-scale evidence we will ever have. Its findings are certainly much more reliable than those of the small RCTs and observational studies that preceded it.

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## Achieving version in breech presentations: 3 approaches

Although it affects only 3% to 4% of term pregnancies, the breech presentation is thought to occur in as many as 50% of gestations prior to 32 weeks.[1] Most of these early breech presentations resolve spontaneously, converting to a cephalic position as the pregnancy progresses. Attempts to facilitate version in the remainder of breech pregnancies typically involve external manipulation, i.e., external cephalic version (ECV), as the fetus nears term.

**The power of suggestion.** In recent years, alternative approaches have proven effective to some degree. In a prospective case series conducted in the early 1990s, 100 gravidas with breech-presenting fetuses at 37 to 40 weeks' gestation were treated with hypnosis and matched with a historical control group of women with similar obstetric and sociodemographic characteristics.[1] Subjects were given hypnotic suggestions for relaxation and the easing of fear and anxiety and were asked why their babies were in the breech position. They received as much hypnosis as possible—barring inconvenience—until the infant converted to the cephalic position or was delivered. Hypnosis was judged to be effective if the infant converted spontaneously or if subsequent ECV was successful. Eighty-one percent of fetuses in the treatment group converted to cephalic presentation by the time of delivery compared with 48% in the control group, a statistically significant difference.

**Asian tradition.** The ancient Chinese practice of moxibustion—the application of heat to acupoint BL 67 from a burning, cigar-shaped roll of herbs—was tested in a randomized controlled trial conducted in Nanchang, China.[2] Because moxibustion is a popular remedy for breech presentation in China, it was impossible to use "sham" moxibustion as a placebo for the control group. (Controls received routine prenatal care but no interventions for breech presentation.) When the smoldering preparation of mugwort, known as "moxa" in Japan, was held beside the outer corner of the fifth toenail, fetal activity increased and conversion to the cephalic position occurred in 98 of 130 fetuses (75.4%) in the treatment group—82 of them during the first week of treatment—compared with 62 of 130 fetuses (47.7%) in the control group. During treatment, the women were asked to record the number of active fetal movements for 1 hour each day. The mean number of fetal movements during a 7-day period was 48.45 for women treated with moxibustion compared with 35.35 for the controls. Researchers postulated that moxibustion acts by increasing fetal movements, although there is evidence that it also affects maternal plasma cortisol and prostaglandin levels.[3,4]

**The tried and true.** ECV itself is a very old procedure, having been described in the literature as early as 1860.[5] Before the development of imaging technologies, fetal presentation was determined using Leopold's maneuvers, and version typically was performed without tocolysis or sedation, with poor success rates. Today, breech presentations are confirmed by ultrasound imaging, which also yields information on the type of breech and the positioning of the fetal spine, neck, and head. Along with estimated fetal weight, these factors are useful in predicting the success of ECV for a given patient. Fewer than 10% of successfully converted fetuses return to the breech position.

A prospective study of pregnancy outcomes after successful ECV found a higher risk of dystocic labor and fetal distress than for pregnancies with spontaneously occurring cephalic presentation, suggesting that the cephalic position per se does not completely eliminate the risk of cesarean delivery.[6] Among the pregnancies in which ECV was successful, the incidence of intrapartum cesarean delivery was 16.9%—2.25 times higher than for controls ($P<.005$).

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## A historical perspective

In 1956, the cesarean delivery rate for viable, breech-presenting fetuses was 10.7%.[1] The figure was low because the standard of care in the United States was to allow most gravidas carrying such fetuses a trial of labor at term. The vaginal-delivery rate did not begin to decline significantly until after 1969.

Although 2 small randomized controlled trials (RCTs) in the early 1980s found no difference in perinatal outcome between a trial of labor and elective cesarean in carefully selected breech infants at term,[2,3] vaginal delivery rates continued to decrease. By 1985, only 15% of breech-presenting infants were delivered vaginally.[4]

When the issue of mode of delivery was examined by meta-analysis in 1995, the results indicated a higher risk of fetal injury and death in selected term breech infants after a trial of labor compared with elective cesarean.[5] However, because the meta-analysis combined randomized trials and cohort studies, these findings were equivocal.

A number of retrospective, register-based studies also were published in the 1990s.[6-11] Although the majority of these studies indicated a poorer outcome after vaginal breech deliveries, obstetricians did not readily accept their conclusions, since a register-based study is not able to control for many confounding variables. Indeed, because of the low incidence of breech presentations and the rarity of the outcomes taken into consideration (fetal death and significant fetal injury), it was clear that only a large, multicenter, randomized trial would help to resolve the dilemma.

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Some experienced obstetricians may claim that these findings fail to reflect their personal experience with vaginal breech delivery. Such claims demonstrate a lack of understanding of "the law of small numbers." If the risk of perinatal death from planned vaginal birth is 1.2% (or 0.6% in countries with a low PMR), many experienced obstetricians will never see this relatively rare outcome in their personal series.

To obstetricians who feel that their own vaginal breech delivery technique would yield results more favorable to a policy of intended vaginal birth, I would issue the challenge to subject their technique to prospective, randomized comparison with elective cesarean section.

### Conclusion

As much as it is possible for an RCT to do, the Term Breech Trial takes the "long view," with secondary papers planned on long-term developmental outcomes in the 2 groups (up to 3 years) and long-term maternal outcomes such as incontinence and dyspareunia.

Although it fails to address the long-term implications of cesarean delivery for future reproductive risks such as uterine rupture and placenta accreta, the Term Breech Trial does yield a clear answer to the question of which treatment is better for an index pregnancy complicated by a breech presentation at term. That answer is elective cesarean delivery. ■

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