Wolters Kluwer

External cephalic version

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INTRODUCTION — External cephalic version (ECV) refers to a procedure in which the fetus is rotated from a noncephalic to a cephalic presentation by manipulation through the mother's abdomen (figure 1). It is typically performed as an elective procedure in nonlaboring women at or near term to improve their chances of having a vaginal cephalic birth. Women most likely to opt for ECV are those who are well-informed, encouraged to undergo the procedure, believe in its safety, and desire a vaginal birth [1]. Women may choose not to undergo ECV because of fear of the procedure, incomplete information, and preference for planned cesarean delivery.

This topic will discuss the procedure for ECV. The causes, diagnosis, management, and outcome of breech presentation are reviewed separately. (See "Overview of issues related to breech presentation".)

EFFECTIVENESS — The effectiveness of ECV is based on its ability to increase the proportion of fetuses in cephalic presentation at birth and, in turn, decrease the frequency of cesarean delivery. The effectiveness of ECV is supported by a 2015 systematic review of eight randomized trials of ECV at term (n = 1308 women) [2]. Compared with women with breech fetuses who had no attempt at ECV, women who attempted ECV reduced the risk of noncephalic presentation at birth by approximately 60 percent (relative risk [RR] 0.42, 95% CI 0.29-0.61) and reduced the risk of cesarean delivery by approximately 40 percent (RR 0.57, 95% CI 0.40-0.82).

Although ECV decreases the frequency of cesarean delivery compared with no ECV, the cesarean delivery rate after successful ECV remains higher than in the general obstetric population. In a 2014 meta-analysis of observational studies of mode of delivery after successful ECV, the cesarean delivery rate after successful ECV was about twice as high as the rate in women with cephalic-presenting fetuses and no ECV (21 versus 11 percent; RR 2.19, 95% CI 1.73-2.76) [3]. The excess risk of cesarean delivery was due to both dystocia and nonreassuring fetal heart rate patterns.

There is no clear explanation for the increased frequency of dystocia after successful ECV. One theory is that factors common to both breech presentation and successful ECV, such as an unengaged presenting part or small maternal pelvis, are also risk factors for dystocia. Parity also plays a role in risk of dystocia. Multiparous women are more likely than nulliparas to give birth vaginally after successful ECV [4,5].

Of note, in a study that compared cesarean delivery rates for cephalic-presenting fetuses at birth as a result of successful ECV versus cephalic presenting fetuses who spontaneously turned from breech presentation in the third trimester, both groups had a similar rate [6].

SUCCESS RATE — In a systematic review of 84 studies including almost 13,000 version attempts at term, the pooled success rate was 58 percent [7].

- Anterior placenta [2,12,13,15]
- Lateral or cornual placenta [17]
- Decreased amniotic fluid volume [13,15,16,18,19]
- Low birth weight [15,16]
- Descent of the breech into the pelvis [14,18,20]
- Obesity [13,14,18,21]
- Posteriorly located fetal spine [18,22]
- Firm maternal abdominal muscles [23]
- Frank breech presentation [13,22]
- Ruptured membranes
- Tense uterus [14]
- Fetal head not palpable [14]
- Thinner myometrial thickness [24]

Some of these factors may also impede spontaneous version [25].

Factors that enhance success — In addition to absence of the above unfavorable prognostic factors, the presence of favorable prognostic factors, such as nonlongitudinal lie, unengaged presenting part, and black race, increases ECV success rates [26,27]. The fetus in oblique or transverse lie is easier to rotate to a cephalic lie than the breech fetus since only small degrees of rotation are needed and these lies are inherently unstable. In meta-analysis, additional predictors of success were posterior placental location (odds ratio [OR] 1.9, 95% CI 1.5-2.4), complete breech position (OR 2.3, 95% CI 1.9-2.8), and an amniotic fluid index >10 (OR 1.8, 95% CI 1.5-2.1) [28].

A possible reason that black race appears to increase the chance of successful ECV is that the presenting part tends to remain high until the onset of labor in black women, and descent of the presenting part into the pelvis makes ECV more difficult [17,18].

RISKS — The small risk of procedure-related complications must be weighed against the risk associated with persistent breech presentation, including cord prolapse, probable cesarean delivery, and complications of breech birth (whether vaginal or cesarean). Even with a planned cesarean delivery, complications may result from a precipitous labor leading to unplanned vaginal breech birth.

Cesarean delivery is associated with well-described maternal risks. There are also risks to fetus and neonate, such as laceration during hysterotomy, transient tachypnea of the newborn, and possibly sequelae from lack of exposure to vaginal flora [29]. An increased risk for development of some medical illnesses, such as asthma, has also been hypothesized [30-32]. (See "Cesarean delivery: Postoperative issues".)

In a 2008 systematic review of studies of ECV performed after 36 weeks (84 studies and 12,955 women), serious adverse maternal and fetal outcomes after, but not necessarily related to, ECV were infrequent (table 1) [7]:

- Serious complications (stillbirth [n = 12], abruption [n = 11]) occurred in 23 cases: pooled risk 0.24 percent (95% CI 0.17-0.34).
- The pooled risk of fetal death was 0.19 percent (95% CI 0.12-0.27). Only 2 of the 12 deaths were attributed to the procedure; the remainder were unrelated or unexplained. The procedure-related risk of fetal death was approximately 1 per 5000 attempts at ECV.
- The pooled risk of abruption was 0.18 percent (95% CI 0.12-0.26) or 1 in 1200 ECVs.
- Emergency cesarean delivery was performed in 49 cases: pooled risk 0.35 percent (95% CI 0.26-0.47) or 1 in 286 ECVs.
- There was no definite correlation between the risk of complications and whether or not the ECV was successful.

There were several limitations to this analysis. For example, there were significant differences among studies in design, patient populations, ECV techniques, and ascertainment/definition of outcomes. Since many studies did not determine relevant outcomes among women with breech presentation who did not have an ECV, a reliable comparison of the risk of ECV versus expectant management could not be performed. In addition, there was no assessment of maternal satisfaction, including degree of discomfort and, possibly, negative psychological effects in the event of failure [7,33-35]. The overall results were comparable to those in the largest single study, a series of 805 consecutive version attempts [36].

Observational studies above are not able to measure the likelihood of complications had ECV not been attempted. Randomized trials would provide higher quality evidence, but have been too small to determine whether the overall risk of perinatal mortality is significantly increased or decreased after ECV compared with other approaches. In a 2015 systematic review of these trials, perinatal death occurred in 2 of 644 babies in the attempted ECV group and 6 of 661 babies in the group of breeches that did not undergo ECV (relative risk perinatal death 0.39, 95% CI 0.09-1.64) [2].

ALTERNATIVES — There are a number of alternatives to ECV, including expectant management, postural maneuvers to facilitate spontaneous version, moxibustion, and acupuncture.

Expectant management — Options for expectant management include (1) expectant management with planned cesarean delivery (scheduled or unscheduled) of a persistently breech fetus or (2) expectant management with a trial of labor of a persistently breech fetus. (See "Overview of issues related to breech presentation", section on 'Choosing the route of delivery at term'.)

Since spontaneous version may occur at any time, even after a failed ECV, a case can be made for delaying cesarean delivery for breech presentation until late pregnancy or early labor. The frequency of spontaneous cephalic version following a failed ECV attempt was 6.6 percent in one study [13]. Risks associated with delaying cesarean delivery include potential complications of persistent breech presentation, such as cord prolapse or precipitous labor if membranes rupture, as well as the risks of planned but intrapartum cesarean (eg, higher frequency of maternal infection). There are insufficient data to balance the potential benefits and risks of expectant management, but risks are probably low for most patients.

Postural maneuvers to facilitate spontaneous version — There is no high-quality evidence that maternal postural changes facilitate spontaneous version, but data are limited. In a 2012 systematic review, maternal postural management had no significant effect on the rate of noncephalic births, either for the subgroup in which no ECV was attempted or for the group overall, compared with no intervention (relative risk [RR] 0.98, 95% CI 0.84-1.15; six randomized and quasi-randomized trials, n = 417 women) [37]. Postural management included techniques such as pelvic elevation using a knee-chest position with or without a full bladder [38,39]

Moxibustion and acupuncture — Moxibustion refers to a type of Chinese medicine in which an herb is burnt close to the skin of the acupuncture point Bladder 67 (BL67) (Chinese name Zhiyin), located at the tip of the fifth toe. It has been proposed as a means of correcting breech presentation and has been used alone and with acupuncture. The procedure is performed for 20 to 60 minutes, once or twice per day, two to seven times per week for one to two weeks.

In a 2012 systematic review that compared moxibustion with observation alone in women with a singleton breech fetus, moxibustion did not result in a statistical reduction in noncephalic presentation at birth compared with no intervention (RR 0.90, 95% CI 0.67-1.19; three randomized trials, n = 594 subjects) [41]. There were no serious adverse events, although some women complained of pain, nausea, or an unpleasant odor. Given the significant heterogeneity among the trials, we feel there are insufficient data to recommend for or against use of moxibustion for version of the nonvertex fetus.

COST-EFFECTIVENESS — ECV has been reported to be cost-effective in studies from the United States and United Kingdom [42,43]. In one such study, ECV was cost-effective when compared with a scheduled cesarean delivery for breech presentation when the probability of successful ECV was greater than 32 percent [42].

CANDIDATES FOR ECV — ECV is offered to women with a noncephalic fetal lie to improve their chances of having a cephalic vaginal birth. While the factors discussed above impact the average likelihood of ECV failure or success, the author's experience is that it is very difficult to predict success or failure in an individual case. For example, women with a normal body mass index (BMI) in one large series had an ECV success rate of 65 percent, of whom 81 percent delivered vaginally; women with BMI ≥40 kg/m^2 had 59 percent ECV success rate, of whom 60 percent delivered vaginally [21]. The author has performed an ECV in a woman weighing 196 kg that proved to be surprisingly easy. Thus, it is reasonable to attempt ECV in women with risk factors for failure. All women should be informed of the possibility of failure, whether or not risk factors for failure are present. (See 'Success rate' above.)

Potential contraindications — There is no consensus about contraindications to ECV, except when labor and vaginal birth are contraindicated regardless of fetal presentation (eg, placenta previa, previous Classical cesarean delivery), and no strong evidence on which to base recommendations [44].

Based primarily on expert opinion, ECV is generally contraindicated in the following settings, which are associated with a low likelihood of successful version and/or increased risk of fetal harm from the procedure:

- Severe oligohydramnios.
- Nonreassuring fetal monitoring test results.
- Hyperextended fetal head.
- Significant fetal or uterine anomaly (eg, hydrocephaly, septate uterus).
- Placental abruption.
- Ruptured membranes.
- Active labor with fetal descent (See 'Intrapartum ECV' below.)
- Multiple gestation. Although a contraindication to antepartum ECV, internal or external version is widely considered an acceptable approach for the second twin after delivery of the first twin. (See "Twin pregnancy: Labor and delivery", section on 'Cephalic-noncephalic twins'.)

weight, as long as a trial of labor and vaginal birth is planned [45]. In a retrospective study, neither ultrasound-estimated fetal weight, nor birthweight when birth occurred within a week of the procedure, was associated with ECV success [45].

There are sparse data on the risk of ECV in the presence of one or more nuchal cords [46,47] and no guidelines for managing ECV in these pregnancies. One of the reasons for routine fetal heart rate monitoring during and following ECV is to detect fetal heart rate changes associated with cord entanglement/compression. Some clinicians do not perform ECV if a nuchal cord is present, but there is no consensus on this. Serious fetal rate abnormalities during ECV, such as prolonged bradycardia, are uncommon [48]. (See "Nuchal cord", section on 'Breech presenting fetus'.)

Although there is a theoretical risk of maternal to fetal HIV transmission in HIV-infected women who undergo ECV, the risk is likely to be very small and compares favorably with the risk of vaginal breech delivery (if cesarean delivery is unavailable) [49].

Previous cesarean delivery does not appear to reduce ECV success rates, but there is only limited evidence that it is safe in this population. The American College of Obstetricians and Gynecologists does not consider a prior low transverse cesarean delivery a contraindication to external cephalic version [50]. A study that included 42 cases of ECV after a previous cesarean from the author's institution and another 124 cases from published series reported an overall success rate of 75.5 percent, with favorable maternal and fetal outcomes [51]. A subsequent prospective cohort study reported ECV success rates were similar among women with and without previous cesarean delivery (67 versus 66 percent), but vaginal birth rates were lower in the previous cesarean group (53 versus 75 percent) [52]. There were no adverse outcomes among the 70 women with previous cesarean. More and larger trials are needed to establish the safety of ECV following cesarean delivery.

PREPROCEDURE

Ultrasound examination — Prior to performing ECV, an ultrasound examination should be performed to confirm fetal and placental position (placenta previa is a contraindication to vaginal delivery) and to look for oligohydramnios and significant fetal or uterine anomalies (which can reduce the likelihood of success and may warrant not proceeding with ECV).

Assessment of fetal well-being — Fetal well-being should be documented by a reactive fetal heart rate pattern or satisfactory biophysical profile score before exposing the fetus to a potentially stressful procedure.

Counseling — In addition to a description of the procedure, some of the elements of informed consent include a discussion of:

- Why the procedure is being performed
- Overall success rate (the pooled success rate was 58 percent in a 2008 systematic review of 84 studies including almost 13,000 version attempts at term [7])
- The small chance that the fetus will spontaneously revert to breech
- Risks (table 1)
- Procedure-related discomfort
- Side effects of any medications that may be administered

breech presentation)

- Alternatives to ECV (eg, expectant management, scheduled cesarean delivery, vaginal breech birth)

Counseling is more effective and patient satisfaction is higher if a structured decision aid for women with breech presentation is used [53,54].

Oral intake — Given the low complication rate, we and others believe intravenous access and avoidance of oral intake before the procedure are unnecessary [55]. However, some providers place an intravenous catheter and restrict oral intake for four to 8 hours before the procedure in case emergency cesarean delivery becomes necessary [56].

PROCEDURE — The procedure should be performed by an experienced operator in a facility with ready access to emergency cesarean delivery.

A video-recorded teaching program on ECV technique is included in the World Health Organization (WHO) Reproductive Health Library (http://apps.who.int/rhl/videos/en/index.html; CD available from RHL@who.int) and a model abdomen for training has been developed [57]. Modifications of this technique have been reported [58].

We suggest performing ECV according to a protocol. In one study, implementation of a standardized protocol for ECV was associated with a significant increase in the success rate, which increased from 47 percent (110/236 pregnant women) to 61 percent (85/139 pregnant women) [59]. The author's protocol is described below.

Our approach — Various techniques have been reported but have not been compared in randomized trials [60]. Our technique is described in the following paragraphs and algorithm (algorithm 1).

Women are informed of the relative advantages and disadvantages of ECV attempts in order to make an informed choice. This choice is likely to be influenced by the value the woman places on a vaginal cephalic birth. For women with breech fetuses who have no contraindications to the procedure, we offer ECV at ≥36+0 weeks of gestation. This approach takes advantage of the higher probability of turning the fetus before term, the higher probability that the fetus will remain cephalic if ECV is performed near term versus earlier, and the high probability that the fetus is mature or nearly mature in the event of complications necessitating urgent cesarean delivery [61,62]. The American College of Obstetricians and Gynecologists (ACOG) recommends discussing ECV at ≥36+0 weeks and performing the procedure at ≥37+0 weeks [63]; RCOG recommends offering ECV from 37+0 weeks, but states ECV may be offered to nulliparas at 36+0 weeks [64]. Although we generally schedule ECV as soon after the minimum gestational age for ECV is reached, there are no contraindications to attempting the procedure at ≥40 weeks of gestation, although data are sparse. (See 'Timing' below.)

We explain each step of the procedure to the woman as we perform the ECV. She is asked to keep her abdominal muscles relaxed and inform the operator if she feels any discomfort, rather than tensing her abdominal muscles, so that the pressure being used can be modified. Good rapport with the woman is essential to help her relax and keep her from tensing her muscles, which makes it harder to manipulate the fetus.

We do not use analgesia for ECV because it does not improve success rates and most women experience only mild discomfort. Use of analgesia can reduce pain, but we believe helping the patient relax and reducing abdominal pressure is a better approach. (See 'Analgesia' below.)

nitrous oxide or remifentanil, routinely or when women request it. Some use regional analgesia when initial attempts are unsuccessful. (See 'Neuraxial anesthesia' below.)

The woman is positioned on a narrow, firm examination table with the fetal back towards the operator. A wedge or cushion can be used to tilt the uterus towards the operator and minimize aortocaval compression.

We administer a beta-adrenergic receptor agonist (eg, salbutamol 0.1 mg in 20 mL saline slowly intravenously while monitoring the heart rate, immediately prior to the procedure or terbutaline 0.25 mg subcutaneously 15 to 30 minutes prior to the procedure) to relax the uterus; however, if clinical assessment suggests that ECV is likely to be achieved easily, an initial attempt without tocolysis may be made. In our practice, this accounts for fewer than 20 percent of cases. Favorable clinical features are a lax uterus, easily palpable fetal parts, mobility of the fetus on palpation, and an unengaged presenting breech. (See 'Tocolysis' below.)

We apply powder (eg, cornstarch) over the woman's abdomen to help the operator's hands slide over the skin while manipulating the fetus. Ultrasound coupling gel can be used to facilitate the procedure rather than powder, particularly when the fetal heart rate is monitored by ultrasound rather than by intermittent auscultation. In a randomized trial, aqueous gel was more effective than powder for reducing maternal pain [65].

The breech is disengaged from the pelvis by slowly inserting the fingertips of both hands deeply behind the symphysis pubis to scoop the breech from the pelvis to a position above the sacral promontory. Some obstetricians prefer to use two operators, one manipulating the breech and the other the fetal head.

The author prefers to begin with a backward somersault, whereas ACOG describes beginning with a forward roll and then attempting a backward roll if the forward roll fails [63].

- **Backward somersault** – For the fetus in the left sacrolateral position with planned backward somersault (figure 2), the operator stands on the woman's left side, on the same side as the fetal back. After disengagement from the pelvis as described above, the breech is held with the edge of the left palm and pushed toward the woman's right flank and upward. If the woman is steeply tilted on her side against a wall, the operator may sit and steady his or her left elbow on the examination table during the rest of the procedure.

  If version is not completed by this maneuver, the head is gently manipulated towards the woman's left flank and downward with the edge of the right hand, taking care to apply most pressure to the breech so that a flexed posture is maintained. Slight back-and-forth movement between the two hands may help promote fetal movement, but generally, pressure on the fetus should be slow and steady rather than repeated pushing.

- **Forward somersault** – For the fetus in the left sacrolateral position with planned forward somersault (figure 1), the operator is positioned on the right side of the woman, on the opposite side as the fetal back. The procedure is similar to that described above, except that once the breech has been disengaged from the pelvis, more pressure is applied to the head than the breech, to maintain flexion of the baby.

The fetal heart rate is auscultated every two minutes, with interruption of the procedure if bradycardia occurs. In one large series, an abnormal fetal heart rate leading to discontinuation of the ECV occurred in approximately 5 percent of cases [66].

Evidence

Timing — Early ECV (34+0 to 35+6) weeks has a higher success rate than term ECV, but this advantage needs to be weighed against the possibility of rare complications necessitating delivery of a preterm infant and lack of convincing evidence of a substantial reduction in cesarean delivery with early versus term ECV.

In the largest trial to address timing of ECV, the Early External Cephalic Version 2 Trial, over 1500 women with singleton breech fetuses were randomly assigned to ECV at 34+0 to 35+6 weeks of gestation (early ECV) or at ≥37 weeks of gestation (term ECV) [67]. Repeated ECV attempts were permitted, as was use of tocolytics and regional analgesia; 98 percent of the procedures were performed by experienced practitioners. The major findings from this trial were:

- Early ECV resulted in significantly fewer fetuses in noncephalic presentation at delivery than term ECV (41.1 versus 49.1 percent; relative risk [RR] 0.84, 95% CI 0.75-0.94).
- Early ECV was slightly less painful than term ECV, but the difference was probably not clinically significant.
- The rate of cesarean delivery was not significantly reduced with early ECV (52 versus 56 percent; RR 0.93, 95% CI 0.85-1.02).
- Complications during the procedure occurred in 3 to 4 percent of patients in each group. The most common complication was a nonreassuring fetal heart rate tracing.
- Early ECV did not significantly increase the risk of preterm birth before 37 weeks (6.5 versus 4.4 percent in patients who underwent late ECV; RR 1.48, 95% CI 0.97-2.26). The median gestational age at delivery for both groups was 39.1 weeks.

When a meta-analysis combined these data with data from some small trials, ECV at 34 to 36 weeks reduced the rate of noncephalic presentation at delivery by 20 percent compared with ECV at ≥37 weeks (RR 0.81, 95% CI 0.74-0.90); however, the decrease in noncephalic presentation was still not accompanied by an equivalent reduction in the cesarean delivery rate (RR 0.92, 95% CI 0.85-1.00) [68]. Reasons include the possibility that fetuses in noncephalic presentation in the third trimester have characteristics that place them at higher risk of having antepartum/intrapartum complications necessitating cesarean delivery even if they turn or are turned to cephalic presentation, and a willingness among European hospitals to deliver the term but not the preterm breech fetus vaginally.

Use of ancillary measures to enhance success — Several ancillary measures have been evaluated to look for ways to improve the success rate of ECV. The rationale for most of these interventions is to relax the uterus and/or anterior abdominal wall musculature and thereby enhance the operator's ability to manipulate the fetus. Tocolysis appears to be effective and is the best studied intervention. Regional anesthesia also appears to be effective, but is costly and invasive.

Other ancillary measures that have been proposed include vibroacoustic stimulation, amnioinfusion, hydration, and analgesia. The limited data on these interventions are discussed below.

Tocolysis — A 2015 systematic review of six randomized trials of ECV with versus without parenteral beta stimulant tocolysis concluded tocolysis was associated with an increased prevalence of cephalic presentation in labor (average relative risk [RR] 1.68, 95% CI 1.14-2.48) and a reduction in cesarean delivery rates (average RR 0.77, 95% CI 0.67-0.88) in both nulliparous and multiparous women [69]. Information on other tocolytics was limited.

one simple regimen is terbutaline 0.25 mg subcutaneously 15 to 30 minutes prior to the procedure.

- There are limited data regarding other tocolytics and no evidence that any of these drugs are more effective than beta-adrenergic agonists:

- **Atosiban** – In a randomized trial of atosiban versus fenoterol for ECV, atosiban resulted in lower rates of successful ECV (34 versus 40 percent; RR 0.73, 95% CI 0.55-0.93) and cephalic presentation at birth (35 versus 40 percent; RR 0.86, 95% CI 0.72-1.03), and a higher cesarean delivery rate (60 versus 55 percent); RR 1.09, 95% CI 0.96-1.20) [71].

- **Glyceryl trinitrate** – Intravenous nitroglycerine [72,73], or sublingual glyceryl trinitrate spray [74-76], have been suggested as alternative uterine relaxants that might have fewer side effects than the beta-adrenergic agonists. (See "Inhibition of acute preterm labor", section on 'Beta-agonists'.)

  A 2002 systematic review of randomized trials evaluating nitroglycerin for uterine relaxation found it was not more effective than placebo for relaxing the uterus for ECV [77]. In addition, a randomized trial of sublingual nitroglycerin (0.8 mg) versus intravenous ritodrine (111 mcg/min) prior to ECV found that nitroglycerin was associated with more side effects (headache, fall in blood pressure) than the beta-adrenergic agonist, as well as fewer successful versions, 9 of 36 women receiving nitroglycerin versus 17 of 38 women receiving ritodrine [75]. However, another group suggested that parity should be taken into account; in their placebo controlled trial, use of intravenous nitroglycerin appeared to increase ECV success in nulliparous, but not multiparous, women [78].

- Nifedipine – A 2011 systematic review including two trials comparing nifedipine with terbutaline before ECV and one trial comparing nifedipine with placebo before ECV concluded that use of nifedipine did not increase the rate of successful version or lower the rate of cesarean delivery [79].

Tocolysis and regional anesthesia — A 2015 systematic review of randomized trials found that regional analgesia plus a tocolytic was more effective than a tocolytic alone in achieving a successful version, but this did not result in a proven increase in cephalic presentations in labor (RR 1.63, 95% CI 0.75-3.53) nor a proven reduction in cesarean delivery (RR 0.74, 95% CI 0.40-1.37) [69]. Additional trials are needed to clarify this issue.

Neuraxial anesthesia — In a 2016 meta-analysis of nine randomized trials comparing neuraxial anesthesia versus intravenous or no analgesia in 934 attempted ECVs, use of neuraxial anesthesia [80]:

- Increased the ECV success rate by 44 percent (58.4 versus 43.1 percent, RR 1.44, 95% CI 1.27-1.64)

- Increased the rate of cephalic presentation in labor by 37 percent (55.1 versus 40.2 percent, RR 1.37, 95% CI 1.08-1.73)

- Increased the vaginal delivery rate by 21 percent (54.0 versus 44.6 percent, RR 1.21, 95% CI 1.04-1.41)

- Reduced the cesarean delivery rate by 17 percent (46.0 versus 55.3 percent, RR 0.83, 95% CI 0.71-0.97)

Although a theoretic risk of neuraxial anesthesia is that abolishing the mother's sensation may allow excessive use of force and thus increase the risk of complications, complication rates were similar in both groups.

The cost of neuraxial anesthesia for ECV may be offset by the reduced rate of cesarean delivery after successful version [81].

reduced (RR 0.17, 95% CI 0.05-0.60) with this intervention [82]. More data are needed to prove the efficacy of this approach, but use of vibroacoustic stimulation is reasonable since it is inexpensive, well-tolerated, and harmless.

Amnioinfusion — Amnioinfusion does not appear to improve success rates. Two small uncontrolled studies of amnioinfusion before ECV reported discordant results. In one, six women with failed ECV had a successful repeat attempt following transabdominal amnioinfusion with 700 to 900 mL warmed saline [83]. In the other, however, none of seven cases was successful [84]. A randomized trial was stopped early because of recruitment difficulties, but did not report a higher rate of cephalic presentation at delivery when amnioinfusion was performed before a second attempt at ECV [85]. (See "Amnioinfusion", section on 'Transabdominal approach'.)

Hydration — Preprocedure hydration does not appear to improve success rates. In a prospective cohort study, maternal intravenous infusion with 2 L of hypotonic saline over two hours before ECV increased amniotic fluid volume but did not result in higher ECV success rates compared with women who did not receive the intervention (ECV success 43 and 47 percent, respectively) [86].

Similarly, in a randomized trial, oral hydration with 2 L of water two hours before ECV increased amniotic fluid volume but did not result in a statistically higher ECV success rate compared with women who did not receive the intervention (ECV success 54 and 46 percent, respectively, odds ratio 1.34, 95% CI 0.69-2.59) [87].

Analgesia

- Nitrous oxide – In a cohort study, inhalation of nitrous oxide (50 percent) reduced the proportion of women who experienced severe pain during ECV, without other effects on the outcomes [88].
- Remifentanil – In a randomized trial, intravenous remifentanil with bolus doses on demand during ECV reduced maternal pain and increased maternal satisfaction without adverse effects, but did not affect the ECV success rate [89].

Hypnosis does not appear to be effective for pain relief during ECV [90] but may increase success rates as a result of maternal relaxation [91].

Special situations

Intrapartum ECV — ECV appears to be a safe option for women who present in labor with an unengaged breech presentation, intact membranes, normal amniotic fluid volume, and no contraindications to the procedure. Small case series have reported successful intrapartum ECV in this setting [18,92,93]; tocolysis was used in some series. Available data are insufficient to determine whether intrapartum ECV is more or less successful than antepartum ECV.

Advantages of delaying ECV until labor begins are that the maximum time for spontaneous version has been provided, the fetal condition can be monitored continuously from beginning of ECV to birth, cesarean delivery can be performed expeditiously since the woman is already on the labor unit, and administration of anti-D immune globulin can be delayed until the neonate's blood type is known (and thus avoided if the neonate is Rh(D)-negative).

The disadvantages of planned intrapartum ECV are that the opportunity to perform ECV may be lost due to descent of the breech into the pelvis, ruptured membranes, or rapid labor.

Nonlongitudinal lies — Because there is a tendency for a nonlongitudinal lies (ie, transverse, oblique) to recur, we delay ECV in these pregnancies until labor induction is appropriate (usually 39 weeks); after

Monitoring — After the ECV, fetal well-being is evaluated by cardiotocography. We monitor the fetal heart rate (FHR) until it is stable and reactive rather than for a minimum period of time. It is common for FHR tracings to be nonreactive for 20 to 40 minutes after ECV. These changes may reflect the fetal response to a transient period of stress caused by decreased uteroplacental blood flow during the procedure [94].

In a prospective cohort study including 980 women who underwent ECV (60 percent success rate), abnormal FHR patterns occurred in 9 percent and were associated with lower estimated fetal weight and longer duration of the procedure, but not with subsequent mode of delivery or fetal distress during labor [95]. Two emergency cesarean deliveries were performed because of FHR abnormalities after ECV.

Anti-D-immune globulin — Most authorities recommend administering anti-D immune globulin to Rh(D)-negative women immediately after ECV. Fetomaternal hemorrhage is almost always less than 30 mL. Given the extremely low risk of a large fetomaternal bleed, performing a Kleihauer-Betke or similar test to quantitate fetomaternal bleeding appears to be unnecessary before administration. (See "Prevention of Rhesus (D) alloimmunization in pregnancy", section on 'Prophylaxis after antepartum events associated with placental trauma or disruption of the fetomaternal interface'.)

In a prospective observational study that performed Kleihauer-Betke tests before and after ECV in over 1000 women, both tests were negative in 1214 women; 30 women (2.4 percent) converted from negative to positive: 20 of these women had only rare fetal erythrocytes on the Kleihauer-Betke smear, 10 had an estimated bleed greater than 1 mL, and 1 had an estimated bleed of 80 mL [96]. Risk factors for fetomaternal bleeding could not be identified. Others have also reported rare cases of massive fetomaternal hemorrhage [97,98].

Management after successful ECV — Routine prenatal care is resumed after successful version of the breech. We agree with the American College of Obstetricians and Gynecologists to avoid immediate induction (ie, stabilizing induction) in an attempt to minimize the chance of reversion [63]. The rate of reversion to breech is small, while induction is associated with longer labors, increases the risk of neonatal morbidity if performed at <39 weeks of gestation, may increase the risk of cesarean delivery, and can be costly.

In a cohort study including 627 women, factors that increased the risk of cesarean delivery after successful version included labor induction, less than two weeks between ECV and delivery, high body mass index, and previous cesarean; the overall cesarean delivery rate was 15 percent [99]. In another study of 301 successful ECV procedures, the cesarean delivery rate was 13 percent and the instrumental delivery rate was 6 percent [100]. Nulliparity was the only predictive factor for these delivery outcomes.

Management after unsuccessful ECV — If ECV for breech presentation is unsuccessful or the fetus reverts to breech, one or two retrials of version can be attempted in one or more days. We would not reattempt ECV after two unsuccessful attempts on separate days (algorithm 1).

Some breeches will spontaneously turn. One study noted that, after unsuccessful ECV, multiparous women were more likely than nulliparas to have spontaneous version to cephalic presentation (12.5 versus 2.3 percent) [101]. Delivery of women with persistent breech presentation is reviewed separately. (See "Overview of issues related to breech presentation" and "Delivery of the fetus in breech presentation".)

SOCIETY GUIDELINE LINKS — Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Breech presentation and external cephalic version".)

SUMMARY AND RECOMMENDATIONS

increased frequency of dystocia and nonreassuring fetal heart rate tracings in labor compared with the general obstetrical population. (See 'Effectiveness' above.)

- ECV reduces the risk of noncephalic presentation at birth by approximately 60 percent, but maternal and fetal characteristics influence the rate in individual patients. (See 'Factors that impede success' above.)
- The types and frequencies of risks of ECV are described in the table (table 1). (See 'Risks' above.)
- We avoid ECV in settings associated with a low likelihood of successful version or increased risk of fetal harm from the procedure. (See 'Candidates for ECV' above.)
- We suggest performing ECV at ≥36 weeks of gestation (**Grade 2B**). ECV has been proven to have a high degree of safety and success at this gestational age. ECV attempts can be initiated earlier (34 to 35 weeks) to improve the success rate (ie, noncephalic presentation at delivery), but the safety of ECV performed before 36 weeks is less well-established and there is no strong evidence of a reduction in cesarean delivery. (See 'Timing' above.)
- ECV can be performed in early labor if membranes are intact and there are no contraindications. (See 'Timing' above.)
- Our approach to ECV is illustrated by the algorithm (algorithm 1). We administer a beta-adrenergic receptor agonist prior to ECV to relax the uterus, except in patients in whom clinical assessment suggests that ECV is likely to be achieved easily. One option is terbutaline 0.25 mg subcutaneously 15 to 30 minutes prior to the procedure. (See 'Tocolysis' above.)
- We do not use neuraxial anesthesia routinely; however, it is a reasonable option when ECV with tocolysis alone is unsuccessful. In cases where cesarean delivery is planned in the event of persistent breech presentation, ECV may be attempted at the time of planned cesarean, which can follow unsuccessful ECV while the neuraxial anesthetic is still effective. (See 'Neuraxial anesthesia' above.)
- After the ECV, we monitor the fetal heart rate until it is stable and reactive. It is common for fetal heart rate tracings to be nonreactive for 20 to 40 minutes after ECV. (See 'Postprocedure' above.)
- We administer anti-D immune globulin to Rh(D)-negative women who undergo ECV. (See 'Postprocedure' above.)
- We do not perform an elective induction immediately after ECV for breech presentation. However, because there is a tendency for a nonlongitudinal (ie, transverse, oblique) lies to recur, after successful ECV of a nonlongitudinal lie, some clinicians perform amniotomy to stabilize the lie, and then induce labor. (See 'Postprocedure' above.)
- If the initial attempt at ECV is unsuccessful, we offer the woman a reattempt of the procedure in one or more days. After two unsuccessful attempts on separate days, we would not try again. (See 'Management after unsuccessful ECV' above.)

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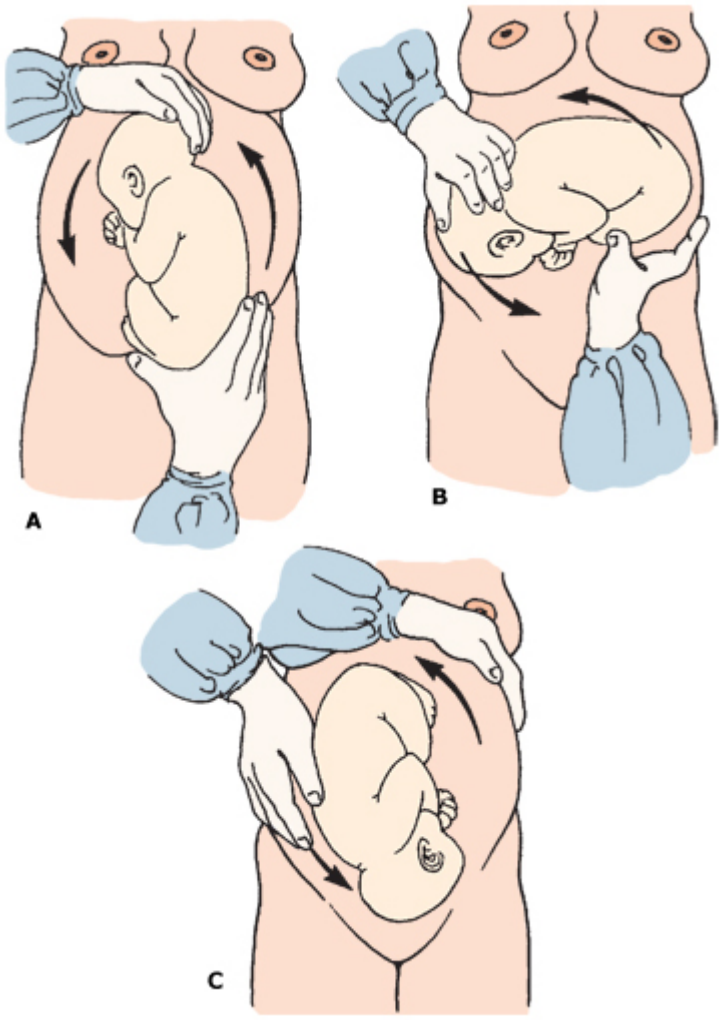
Topic 6779 Version 40.0



Fetus is converted from breech to vertex presentation in (A) through (C).

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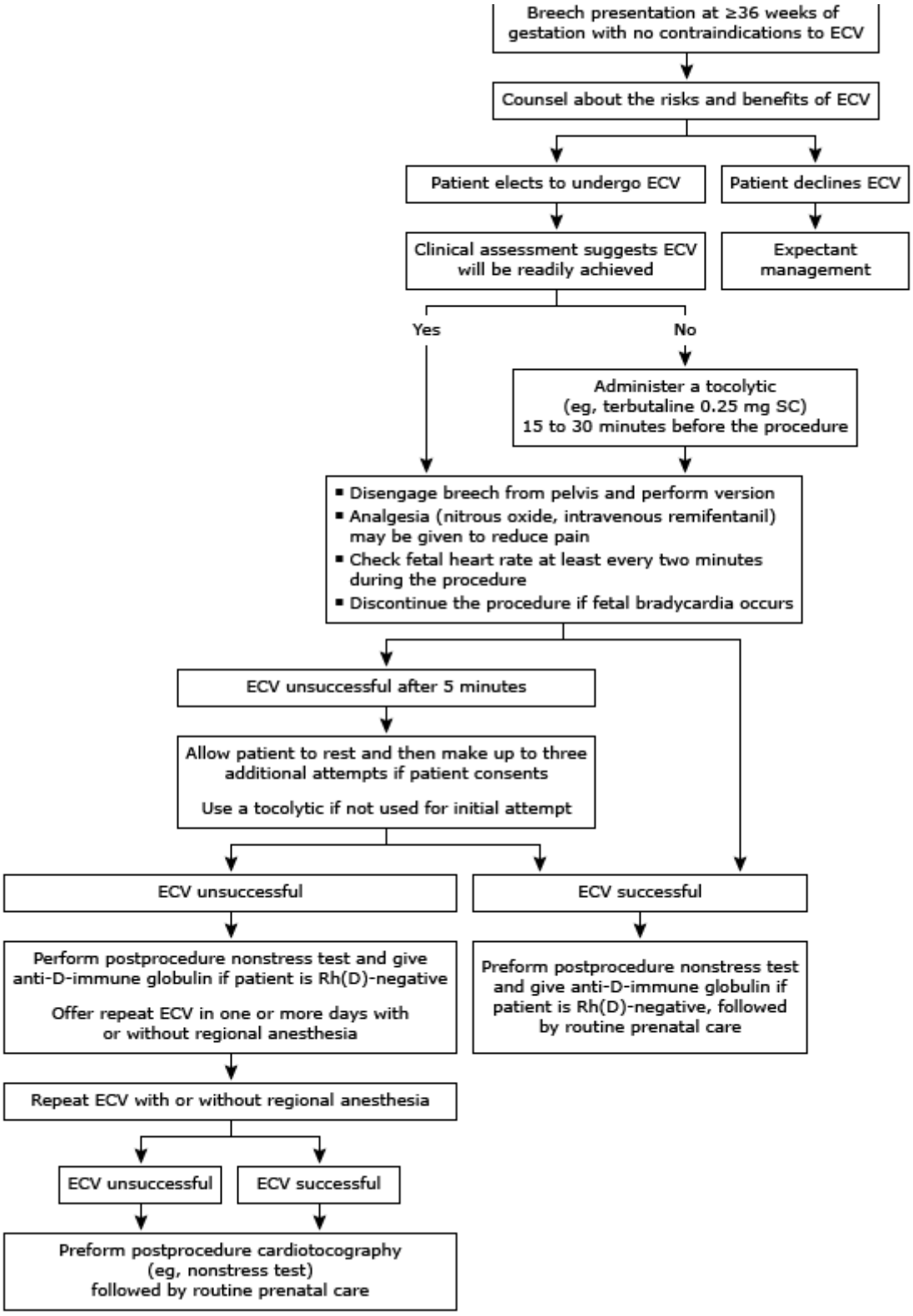
Graphic 63535 Version 5.0

Overall risk of complications	6.1
Transient fetal heart rate changes	4.7
Fetomaternal transfusion	0.9
Emergency cesarean delivery	0.4
Vaginal bleeding	0.3
Ruptured membranes	0.2
Fetal death	0.2
Placental abruption	0.2
Cord prolapse	0.2

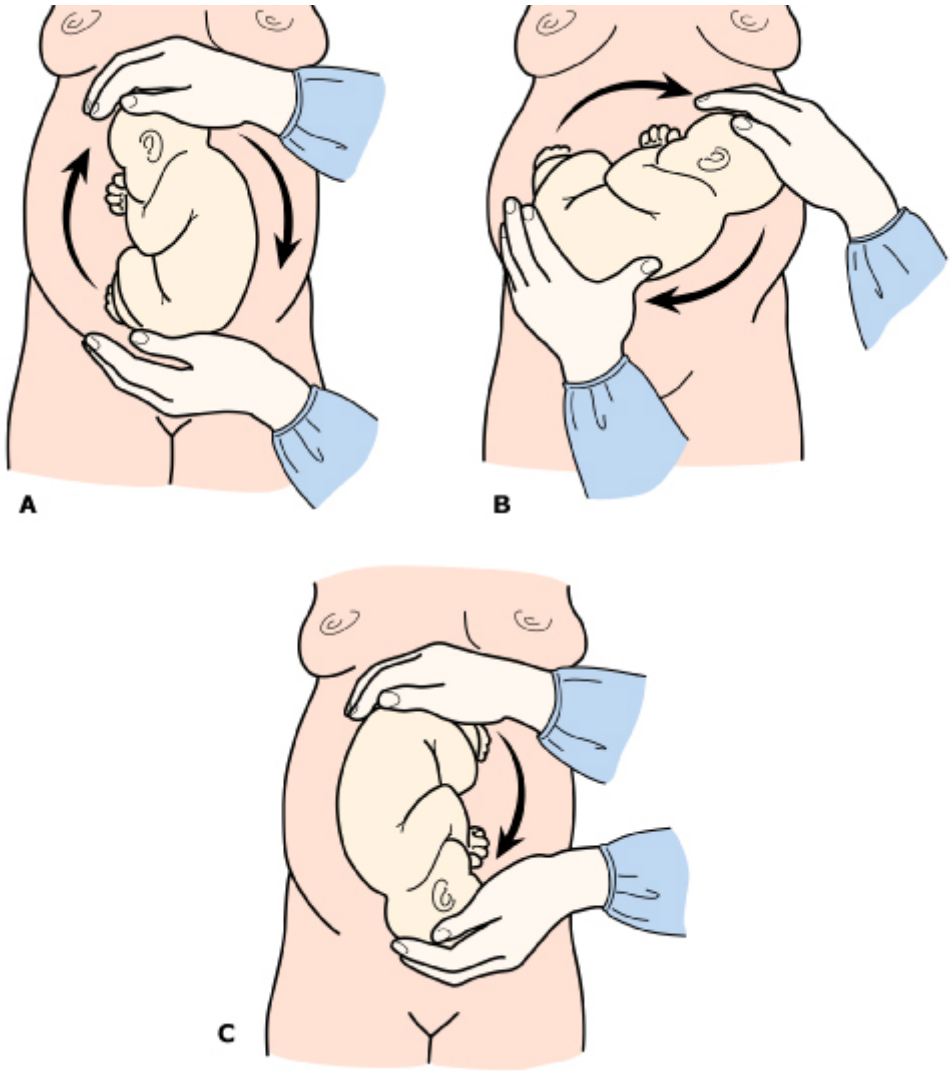
Data from: Grootscholten K, Kok M, Oei SG, et al. External cephalic version-related risks. A meta-analysis. Obstet Gynecol 2008; 112:1143.

Graphic 64649 Version 3.0



SC: subcutaneously.

Graphic 100240 Version 2.0



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Graphic 99955 Version 1.0

disclose **Vanessa A Barss, MD, FACOG** Nothing to disclose

Contributor disclosures are reviewed for conflicts of interest by the editorial group. When found, these are addressed by vetting through a multi-level review process, and through requirements for references to be provided to support the content. Appropriately referenced content is required of all authors and must conform to UpToDate standards of evidence.

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