

## Prolonged Pregnancy: To Induce or Not To Induce?

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pregnancies and when fetal testing is used to ascertain the risk of prolonged pregnancy, the ability to reserve induction of labor for cases of necessity where risk has been proven is increased, to the benefit of mothers and babies.

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## **Prolonged Pregnancy: To Induce or Not To Induce?**

### **I. Introduction**

At 40 weeks gestation, most mothers *feel* ready to deliver. In addition, some caregivers allow or encourage medical induction of labor as early as a day after the due date, while most will strongly advocate for induction by 42 weeks at the latest. Though this practice often makes both the parents and the caregiver happy, it is important to examine the implications of a pregnancy lasting longer than 40 weeks, as well as those of induction, before deciding on the safety of either. In order to effectively minimize risk, it is incumbent upon caregivers and parents to: 1) understand how a 40+ week pregnancy could put the mother or baby at risk; 2) understand the risks of labor induction; and 3) understand the scientific efficacy of labor induction in alleviating complications of a pregnancy lasting longer than 40 weeks, specifically by understanding the effects of routine induction for dates only and the determination of risk. These considerations point to two conclusions about induction of labor based on its consequences to the health of mothers and babies: 1) Induction of labor should not be used routinely, that is, simply because a pregnancy has reached a certain gestation; and 2) Induction of labor should be used only when the well-being of mother or baby depends upon immediate delivery.

### **II. Definition of Terms**

A *term* pregnancy is one that lasts at least until 38 weeks gestation and does not go beyond the end of the 42<sup>nd</sup> week (Lowdermilk and Perry 348), while a *term* infant is defined as one who is born between the 38<sup>th</sup> and 42<sup>nd</sup> week of pregnancy (Lowdermilk and Perry G-29). A *postterm* or *postdate* pregnancy is one that lasts longer than 42 weeks gestation (Lowdermilk and Perry 348; Davis 86;

Amis 17; Iwanicki and Akierman 2028; Cardozo, Fysh, and Pearce 1061); this will be the definition accepted here, though Simkin, Whalley, and Keppler define a “post-date” pregnancy as a pregnancy of 41 weeks or longer (34), and Hussain et al. define a “post-term” pregnancy as a pregnancy of more than 41 weeks (2). A *postmature infant* is one born after the 42<sup>nd</sup> week of gestation who shows “the effects of progressive placental insufficiency” (Lowdermilk and Perry 731). Simkin, Whalley, and Keppler say that a baby is deemed post-mature if it has no lanugo, little vernix, long nails, skin that is cracked, peeling, pale, dry, or loose, and abnormal alertness (34). Korte and Scaer say that a pregnancy lasting longer than 42 weeks is deemed “prolonged” (156). However, a 42+ week pregnancy will here be termed *postterm* or *postdate* (as per Lowdermilk and Perry, Davis, Amis, Iwanicki and Akierman, and Cardozo, Fysh, and Pearce, above). A *prolonged* pregnancy will be defined here simply as a pregnancy lasting longer than 40 weeks, whether a *term* pregnancy of 40 to 42 weeks or a *postterm/postdate* pregnancy lasting longer than 42 weeks. Finally, induction of labor is defined as starting labor “artificially” (Korte and Scaer 113) and more specifically as “the chemical or mechanical initiation of uterine contractions before their spontaneous onset for the purpose of bringing about the birth” (Lowdermilk and Perry 1006). This can include, but is not limited to, stripping the membranes, dilating the cervix, artificially rupturing the membranes, applying various prostaglandins to the cervix, and/or administering intravenous Pitocin (synthetic oxytocin).

### **III. Causes and Rates of Prolonged Pregnancy**

Simkin, Whalley, and Keppler say that some pregnancies of 41 weeks or longer result from flawed due dates, while some fetuses need more time in utero (34). According to Korte and Scaer, most reports concurred that “about 50 percent of pregnancies called prolonged are not past term but reflect mistaken due dates” (157). Lowdermilk and Perry say “many pregnancies are misdiagnosed as

prolonged” (1024). Reasons for this include 1) the mother’s irregular menstrual cycle causes inaccurate dates for the pregnancy; 2) the mother does not know an accurate date for her last menstrual period; and 3) the mother did not begin receiving prenatal care until later in the pregnancy or not at all (Lowdermilk and Perry 1024). What causes *postterm* pregnancy is not known, but a deficiency in estrogen produced by the placenta and continued release of progesterone is a possible cause (Lowdermilk and Perry 1024). Low estrogen levels can cause “a decrease in prostaglandin precursors and reduced formation of oxytocin receptors in the myometrium (Gilbert & Harmon, 2003)” (Lowdermilk and Perry 1024). Davis says that heredity and emotional issues can cause a longer pregnancy (86).

According to Lowdermilk and Perry, *postterm* pregnancy is estimated to occur in 4-14% of pregnancies, the average rate being 10% (1024). However, Iwanicki and Akierman say that, though the rate of *postterm* pregnancy “used to be assessed as 10%-12% of all pregnancies,” use of ultrasound to date pregnancies caused a reduction of this number to lower than 1.1% (2028). Davis says, though, that “it is estimated that up to 19 percent of pregnancies” continue past 42 weeks (86). She also says that, according to the Mittendorf study, the average gestation is 41 weeks and one day (19), though Simkin, Whalley, and Keppler, Korte and Scaer, and Iwanicki and Akierman indicate an average of 40 weeks (34, 156, and 2028, respectively). A mother who has one *postterm* pregnancy is “30% to 40% more likely to experience it again in subsequent pregnancies (Arulkumarian, 1997)” (Lowdermilk and Perry 1024).

#### **IV. Indications of Labor Induction for Prolonged Pregnancy**

##### 1. Description of Fetal Complications and Risks of Prolonged Pregnancy

Iwanicki and Akierman say that *postterm* pregnancy is linked to oligohydramnios, macrosomia, and a higher risk of fetal distress, as well as “a high incidence of placental insufficiency, fetal post-maturity (dysmaturity), and increased risk of perinatal death” (2027). Cardozo, Fysh, and Pearce provide a similar list (1061). According to Lowdermilk and Perry, risks to the fetus caused by a *postterm/postdate* pregnancy stem from two factors (1024). First, when the placenta continues providing adequate nutrients so that fetal growth is supported after 40 weeks, macrosomia can occur, causing possible risks to the baby such as prolonged labor, shoulder dystocia, trauma during birth, and asphyxia (Lowdermilk and Perry 1024). Iwanicki and Akierman say, “Larger post-term infants may be subjected to longer labour and more traumatic delivery, and are less able to tolerate asphyxia without long-term neurological sequelae” (2028). Second, after the 37<sup>th</sup> week gestation, placental function decreases gradually, and an aging placenta can adversely affect the fetus and cause a higher chance of fetal distress during labor (Lowdermilk and Perry 1024, 1025). Hussain et. al. say that, in pregnancies of gestation greater than 41 weeks, the main reason for perinatal morbidity and mortality “is presumed to be the progressive uteroplacental insufficiency” (1). Placental insufficiency can cause the fetus to have a “wasted appearance (dysmaturity) at birth because of loss of subcutaneous fat and muscle mass” (Lowdermilk and Perry 1139). If the *postmature* placenta cannot support sufficient gas exchange, there is a higher risk for intrauterine hypoxia, which can lead to the fetus passing meconium, causing the risk for meconium aspiration syndrome to rise (Lowdermilk and Perry 1139). Simkin, Whalley, and Keppler say that sometimes the “fetus may become post-mature and may not receive sufficient nourishment and oxygen from the aging placenta” (34). They say that in “true post-maturity” the function of the placenta drops, the volume of amniotic fluid declines, and the baby

could be stressed (34). Iwanicki and Akierman say that fetuses with symptoms of postmaturity syndrome “show signs of advanced maturity (hard skull bones, narrow sutures, long fingernails, and well-developed nipples and genitalia), as well as appearances of intra-uterine malnutrition (lack of subcutaneous fat and dry peeling skin)” (2028). Cardozo, Fysh, and Pearce provide a similar list, saying that postmaturity syndrome arises in the group of people “with correct dates in whom maturity occurs at 40 weeks but labour fails to ensue” (1061). Iwanicki and Akierman say that a fetus who is malnourished “may be at higher risk of morbidity and mortality, including growth retardation, meconium aspiration syndrome, and some degree of neurological sequelae” (2028). In the case of “true post-maturity”, Simkin, Whalley, and Keppler say that delivery is necessary (34). However, they also say that “true post-maturity is rare even in babies born two weeks or more after their due dates” and that, in many pregnancies lasting to 41 weeks and beyond, the placenta continues to sustain fetal growth and wellbeing (34). Iwanicki and Akierman also say that “as many as 80% of post-term fetuses appear completely normal” (2028), while Cardozo, Fysh, and Pearce agree that “many fetuses” delivered past 42 weeks, “appear to be completely normal” (1061).

Low amniotic fluid volumes after 40 weeks gestation can cause cord compression and fetal hypoxia (Lowdermilk and Perry 1024). Iwanicki and Akierman say, “Oligohydramnios, common in post-term pregnancy, is associated with a statistically significant increase in fetal acidosis, meconium aspiration, and low Apgar scores” (2028). Hussain et. al. say that pregnancy lasting longer than 41 weeks is linked to greater frequencies of injury during birth, stillbirth, macrosomia (defined as a birth weight greater than 4000 grams), and meconium aspiration syndrome (1). Caughey et al. state that “when the indications of nonreassuring fetal heart rate and cephalopelvic disproportion were examined,” the rates of these complications increased after 39 weeks (4).



Davis agrees with Lowdermilk and Perry that “risks of postdatism are twofold” (Davis 86). First, cephalopelvic disproportion or shoulder distocia are possible if the pregnancy continues healthily and the fetus keeps growing (Davis 86). Secondly, Davis also notes the risks for fetal weight loss, oligohydramnios causing cord compression, fetal distress, and stillbirth but does not attribute these risks to placental condition (86). She says that research shows that the placenta is not “a ‘timed organ’ set to expire with advanced gestation” (86). Instead, she attributes the risks of fetal postmaturity syndrome (reduced maternal blood volume and oligohydramnios, possibly causing cord compression and fetal compromise) to malnutrition and “chronic dehydration” on the mother’s part (86).

Korte and Scaer say that a pregnancy lasting longer than 42 weeks with no error in dates has a higher risk of perinatal mortality, which is “death of the fetus before or during birth” (157). Lowdermilk and Perry say that the mortality rate for the *postmature* fetus and neonate is higher than for a term infant, which can be caused by a failure to meet the fetus’ higher demands for oxygen during labor and birth (1139). Referring to a report by Mary Halperin and Murray Enkin in *ICEA Review*, however, Korte and Scaer say “[p]erinatal mortality is low at term and beyond”; at 40 weeks, the rate is 2.3 deaths in 1000 births but is elevated to 3 deaths in 1000 births at 42 weeks and 4 in 1000 at 43 weeks (157). According to Menticoglou and Hall, “the risk of stillbirth in the subsequent week to women undelivered at the beginning of their 41<sup>st</sup> week (41 weeks zero days) is about 0.1%” (485).

For the *postterm/postdate* newborn, “problems may include asphyxia, meconium aspiration syndrome, dysmaturity syndrome, hypoglycemia, polycythemia, and respiratory distress (Gilbert and Harmon, 2003)” (Lowdermilk and Perry 1025).

## 2. Description of Maternal Complications and Risks of Prolonged Pregnancy

Risks to the mother from a *postterm* pregnancy are usually associated with birthing an “excessively large infant” (Lowdermilk and Perry 1024). In this case, the mother’s risk for dysfunctional labor, trauma to the birth canal (including episiotomy extension and perineal tears), postpartum hemorrhage, and infection are higher (Lowdermilk and Perry 1024). According to Lowdermilk and Perry, there may be a higher likelihood for interventions such as prostaglandin- or oxytocin-induction, instrument assistance during birth, and cesarean section (1024). In their study, Caughey et al. noted that rates of operative vaginal delivery, cesarean section, and maternal labor and delivery complications increased before 42 weeks, with rates of operative vaginal delivery, prolonged hemorrhage, and third- or fourth-degree perineal laceration increasing after 39 weeks and rates of primary cesarean section, postpartum hemorrhage, and endomyometritis increasing after 40 weeks (4). They admitted that this increase in maternal complications may have been contributed to, at least in part, by the rise in Cesarean sections and operative vaginal deliveries, but they say that “even if the increases in operative deliveries could be avoided, it appears that the increases in maternal complications would persist” for most of the complications mentioned (5).

## **V. Disadvantages of Labor Induction for Prolonged Pregnancy**

### 1. Description of Fetal Risks of Labor Induction

Pitocin is a synthetic form of oxytocin, a hormone produced in the laboring mother’s body, which plays a role in labor progress (Korte and Scaer 116). Most of the time, it is very effective in inducing or augmenting labor (Korte and Scaer 116). Korte and Scaer report that women say that their contractions were longer, stronger, and closer together when given Pitocin than when their labor

was not augmented (115). In any labor, normal or induced/augmented, each contraction causes uterine blood supply, and thus the fetal oxygen supply, to decrease temporarily (Korte and Scaer 115). During a normal labor, the time between contractions is sufficient for the baby to receive enough oxygen to allow him to sustain the oxygen restriction during the next contraction (Korte and Scaer 115). During induced or augmented labor, however, two factors can negatively affect the baby's supply of oxygen; first, contractions come closer together, decreasing the time available for oxygenating the baby's blood between contractions, and second, contractions last longer, increasing the time the baby must wait before his blood is fully oxygenated again (Korte and Scaer 115). Korte and Scaer liken the baby's experience to "being pushed into a swimming pool before he has had a chance to catch his breath, and then having someone push him down deeper, just when he had bobbed to the surface for much-needed air" (Korte and Scaer 115). They say, "This possibility of an inadequate oxygen supply for the baby is one reason that all induced or augmented labors are considered at risk for developing complications" (Korte and Scaer 115). The most considerable risks to the baby of induced or augmented labor are shown by research to be fetal distress; a higher likelihood of newborn jaundice; a higher likelihood of premature birth (for induction only), which causes all induced labors to be termed "high risk"; low 5-minute Apgar scores; permanent injury to the fetal central nervous system or brain; and fetal death (Korte and Scaer 116). Korte and Scaer indicate that labor induction is "likely to place infants at great risk of prematurity" (157). Simkin, Whalley, and Keppler also note the risk of fetal distress in an induced labor (274), and Cardozo says that, when compared with spontaneous labor, induced labor is connected with higher rates of instrument-assisted births and low Apgar scores (840). Amis' list of complications that "might be more common" when labor is induced in a healthy mother with a normal pregnancy includes instrument-assisted birth; cesarean section; labor complications such as shoulder dystocia, changes in

fetal heart rate, and fever; low birth weight; NICU admission; jaundice; and longer hospital stay (18). Augensen et al. say, “Oxytocin infusion has been incriminated in raised bilirubin concentrations in the newborn” (1195). The trend was also found in their study; a significantly higher number of infants needed phototherapy in the group whose mothers were induced than in the group whose mothers were not induced (1195). Finally, a link between the use of Pitocin in labor and learning problems in children has been suggested by Doris Haire in “An American Warning”, written for a childbirth journal in Britain (Korte and Scaer 116).

## 2. Description of Maternal Risks of Labor Induction

According to research, say Korte and Scaer, the most considerable risks to the mother of induced or augmented labor are a higher likelihood of having a complicated labor or birth, higher use of analgesia or anesthesia (caused by contraction intensity), postpartum hemorrhage (for induced labors only; whether hemorrhaging is associated with labor augmentation has not been determined by research), and a higher likelihood of placental separation and ruptured uterus, both of which can cause maternal or fetal death (Korte and Scaer 115-116). Cardozo also mentions the higher risk of instrument-assisted delivery and postpartum hemorrhage associated with induced labor as compared to spontaneous labor (840).

According to Simkin, Whalley, and Keppler, “Induction is not a risk-free procedure, and there is no guarantee that it will be successful” (262). There is a higher likelihood of a cesarean when labor is induced than when it begins spontaneously; this is especially true for “first-time mothers” and women whose cervixes are unripe (Simkin, Whalley, and Keppler 262). Iwanicki and Akierman also mention the possibility of labor induction causing a higher incidence of Cesarean sections (2027). They say, “Induction of labour appears invariably to increase Caesarean section rate even if the most successful techniques of induction are used, including prostaglandin gel” (2027). When the mother’s

cervix is favorable, however, they say her risk of having Cesarean surgery “appears to be negligible” (2027). According to Amis, “studies consistently show that inducing labor almost doubles a woman’s chance of having cesarean surgery” (18). Referring to a period of four years in Alberta, Menticoglou and Hall note a 9% increase in Cesarean sections “for women induced in their 41<sup>st</sup> week” as compared with women who “laboured spontaneously in their 41<sup>st</sup> week” (488). They quote the Society of Obstetricians and Gynaecologists of Canada warning against induction of labor before 41 weeks: “particularly in nulligravida...the likelihood of cesarean section may be twice as great when labour is induced as compared with spontaneous” (488).

Cardozo says, “Induced labor is longer...than spontaneous labor” (840). Induction can be long or unsuccessful, which is more likely with an unripe cervix; prostaglandins or cervical dilators may need to be inserted several times before induction is begun, and then Pitocin can take effect slowly, causing hours to elapse before contractions begin (Simkin, Whalley, and Keppler 262). Eating could be forbidden (Simkin, Whalley, and Keppler 262), and “induced labor often creates the need for more medical interventions (Amis 18). Continuous electronic fetal monitoring is insisted on with induced labor and can limit the mother’s choice of movements and “self-help comfort measures and pain relief” (Simkin, Whalley, and Keppler 262). Amis also mentions the necessity of continuous electronic fetal heart rate monitoring in the majority of inductions, as well as the need for an intravenous line for the mother (18). “In many settings,” she says, the mother must stay in or very near the bed, possibly preventing her from walking “freely” and changing positions, which in turn could slow labor progress (18). The mother may also be unable to bathe or shower to relieve pain (Amis 18). In addition to this, labor could be more painful than if it had begun spontaneously (Simkin, Whalley, and Keppler 262). According to Amis, “artificially induced contractions often peak sooner and remain intense longer than natural contractions,” heightening the mother’s need for

pain medication (18). Amis refers to a study that indicated that “women whose medical providers induced labor were more likely to use an epidural or other drugs for pain relief” (18).

Other risks to the mother from Pitocin and other drugs used for induction/augmentation of labor include hyperstimulation of the uterus, excessive retention of fluid, nausea and vomiting, headache, and a possible increased risk for a retained placenta or high blood pressure (Simkin, Whalley, and Keppler 274-275). “Rare side effects include cardiac arrest, eclampsia (postpartum), and pulmonary edema” (Simkin, Whalley, and Keppler 275). Also, according to Amis, labor induction doubles a woman’s risk for amniotic-fluid embolism, an unusual but possibly fatal complication (18).

## **VI. Scientific Efficacy of Labor Induction in Reducing Risks to Baby and Mother**

### 1. The Danger of Routine

#### A. Routine Before 42 Weeks

Regarding induction around 40 weeks gestation, according to a study cited by Iwanicki and Akierman, maternal and fetal outcome was statistically the same “between a group of pregnant women induced and delivered at 39-40 weeks gestation as compared with a group allowed to continue the pregnancy indefinitely” (2027). Another study found fetal and neonatal outcome to also be the same, but the rate of Cesarean surgery increased to 27% (Iwanicki and Akierman 2027). Korte and Scaer indicate that labor induction at 40 weeks is unsupported by research (157). Cardozo says that women whose labors begin spontaneously before their due dates are “fortunate” since maternal and fetal risks “have been shown to increase as ‘term progresses’” (840). “But,” she says, “there is no evidence that inducing labor improves the outcome for mother or baby” (840). Alexander, McIntire,

and Leveno say, “No randomized study to date has indicated that fetal testing or labor induced at 40 or 41 weeks’ gestation changes or improves neonatal outcomes significantly” (293).

Regarding induction at or after 41 weeks gestation, according to Hussain et. al., “a well-established increased risk of adverse perinatal outcome” exists for pregnancies lasting longer than 41 weeks, and using labor induction routinely at or after 41 weeks “seems to be the likely solution for preventing perinatal morbidity and mortality associated with post term pregnancy” (11). They claim that elective labor induction for 41 or 41+ week pregnancies results in “significant reduction in perinatal mortality” and “non-significant reduction in stillbirths;” that elective induction for pregnancies lasting longer than 41 weeks significantly reduced the incidence of meconium aspiration syndrome but did not significantly affect birth asphyxia; and that elective labor induction (with no gestation specified) significantly reduced the rate of macrosomia (11). Caughey et al. refer to a study claiming to find “an overall effect of a lower cesarean delivery rate” for women whose labors were induced than for those who used “expectant management,” though the difference was only 1.9% (5). Caughey et al. state that, at 41 weeks, most evidence corroborates a lower incidence of Cesarean section with labor induction and, because of earlier birth, a lower rate of intrauterine fetal demise as well (5). They “also offer that other maternal complications such as postpartum hemorrhage, choioamnionitis, and endomyometritis that may also be associated with neonatal complications are also lower one and two weeks prior to the 42 week threshold” (5).

However, Amis states, “All obstetric associations define a normal pregnancy as lasting anywhere from 38 to 42 weeks” (17). She refers to a policy used by physicians and authors of *Williams Obstetrics* (Cunningham et al., 2005) of “following closely” women with 41+ week pregnancies (17). These physicians wait until 42 weeks to induce labor (unless labor induction is indicated by another medical situation), saying that inducing at 41 weeks instead of 42 would cause

approximately 500,000 more women per year to “use interventions that have not been conclusively proved necessary or harmless” (17).

Cardozo, Fysh, and Pearce compare women in two groups: those planning routine induction at 42 weeks and those waiting for spontaneous onset of labor (1062). Of the women planning for induction, 36% spontaneously began labor “within 48 hours of planned induction” (1062). “[A]s might be expected, these patients had an excellent outcome which was significantly better than that of the women who required induction of labour” (Cardozo, Fysh, and Pearce 1062). According to Cardozo, Fysh, and Pearce, this “suggests that routine induction for prolonged pregnancy before 42 weeks is meddlesome” (1062). Further, women in the second group whose labors were induced for a medical reason or because they asked to be induced “had a significantly worse outcome than the rest of their group,” though “no worse than the outcome for patients who were electively induced” (1062).

Referring to a claim that “routine induction of labour *after* 41 weeks reduces perinatal death,” Menticoglou and Hall say, “The higher risk that routine induction at 41 weeks aims to reduce is dubious, if it exists at all” (486). With the rate of stillbirth being 0.1% in the 41<sup>st</sup> week “without induction for dates alone or special fetal surveillance,” Menticoglou and Hall say that “the influence of fetal risk is more likely that of perception than reality” (488). They also suggest that at least some Canadian obstetricians “fear medico-legal implications should the fetus die at seven or more days past the due date, with no regard for the true odds and likely causation of such outcomes” (489). Cardozo says that the lowest rate of perinatal mortality occurs at 40 weeks “and does not increase until after 42 weeks, and then only slightly” (840). Cardozo, Fysh, and Pearce refer to studies “which showed that perinatal mortality is at its lowest from 40 to 43 weeks (280-037 days)” (1062).

Menticoglou and Hall say, further,



“The assertion that induction at 41 weeks results in fewer caesarean sections than expectant management is doubtful at best. It is particularly difficult to reconcile with considerable and consistent evidence that induction, especially in nulliparae with unfavourable cervixes, markedly increases the rate of caesarean sections” (Menticoglou and Hall 487-488).

Apparently the Society of Obstetricians and Gynaecologists of Canada’s *Clinical Practice Guidelines* state that women whose pregnancies reach 41 weeks should be counseled “regarding the higher risks to themselves,” but Menticoglou and Hall hold that these women should rather be advised that “the higher risk is of caesarean delivery for dubious reasons” and that to evade this risk, women “should labour and deliver where induction for dates alone is not the ritual at 41 weeks of gestation” (488-489).

In response to the argument that women whose pregnancies reach 41 weeks must eventually go into labor and might just as well be induced at 41 weeks, Menticoglou and Hall contrast being in labor upon arrival and birthing the baby 5-10 hours afterward with being induced with an unfavorable cervix, needing ripening which may or may not be successful, then laboring for 10 or more hours (489). They state: “Routine induction at 41 weeks is ritual induction at term, unsupported by rational evidence of benefit. It is unacceptable, illogical and unsupportable interference with a normal physiologic situation” (490).

Alexander, McIntire, and Leveno seem to agree; they hold that the literature provides little evidence in favor of inducing labor and performing fetal tests at 41 weeks instead of 42 weeks and that “no randomized trial has addressed the subject adequately” (293). To the contrary, their data propose that routine intervention at 41 weeks would probably cause a higher rate of labor complications, meaning longer labors and a higher rate of operative deliveries, and provide only slight

benefit to babies or none at all (293). About 500,000 women would be affected each year by a “national policy of routine intervention at 41 weeks,” and such intervention, they believe, is “unwarranted because of a lack of proven benefit and would result in increased labor complications and health care costs in a significant number of women” (293). Their conclusion: “Routine labor induction at 41 weeks likely increases labor complications and operative delivery without significantly improving neonatal outcomes” (291).

Another consideration is “resource consequences” (Menticoglou and Hall 489). According to Menticoglou and Hall, if routine induction is performed at 41 weeks, approximately 15%-20% more women will have their labors induced than if routine induction is performed at 42 weeks (489). If 4000 babies were born per year in a particular hospital, about 1000 would be born via induced labor simply because the pregnancies had continued to 41 weeks, while only 140-400 would be born via induced labor if induction for dates only was delayed until 42 weeks (Menticoglou and Hall 489). Supposing that these inductions for otherwise uncomplicated pregnancies would be performed on weekdays, if routine induction was performed at 41 weeks, the hospital would be required to manage three extra inductions each day, not including the inductions performed “for legitimate and significant maternal or fetal threat” (Menticoglou and Hall 489). Menticoglou and Hall say, “This is a staggering imposition, given that at least 500 and more likely over 1000 inductions must be done to prevent one perinatal death from unspecified relationships to gestation” (489). They go on to say, “The workload increment for nursing, midwifery and medical staff is significant given the need to induce 15%-20% more of the pregnant population, and in that improved outcomes are dubious, indefensible” (489). Whether routine induction at 41 weeks will decrease the rate of fetal death is unsure, and Menticoglou and Hall say that “it is arguable that such a practice could increase perinatal mortality and morbidity” (489). They state, “Attention is a limited resource;” attention will get pulled away from women who

went into labor on their own “or who are being induced for more compelling reasons” because of the additional attention necessary for the extra inductions and their effects resulting from a policy of routine induction at 41 weeks (489). A mother or baby in a pregnancy of less than 41 weeks who needed assistance and was injured because caregivers were attending to a mother or baby who did not need assistance “will not be counted in morbidity and mortality analysis of intervention by induction of labour at 41 weeks of gestation” (Menticoglou and Hall 489).

#### B. Routine At or After 42 Weeks

According to Lowdermilk and Perry, there are “a variety of medical and obstetric reasons” induction might be needed (1006). *Postdate* pregnancy is listed as one reason, and referring to all the conditions in their list, including *postdate* pregnancy, they state that “the risk to the mother or fetus is less than the risk of continuing the pregnancy” (1006). In addition, Augensen et al. say that, in their study of women around 42 weeks gestation, the “incidence of operative delivery, use of analgesics, or signs of perinatal asphyxia” did not differ between the group of women planning for induction and the group of women waiting for an additional week (1192). Cardozo says that, after 42 weeks, fetal risks “increase slightly,” but she contrasts this risk with the higher likelihood of instrumental delivery and low Apgar scores accompanying labor induction (840).

In *Birth* journal, Madeleine Shearer and Milton Estes wrote, “All studies since 1978 on the management of postterm pregnancy have found no benefit, or increased risks, with routine termination of pregnancy at 42 weeks of gestation” (Korte and Scaer 157). Cardozo, Fysh, and Pearce say: “Thus from our results we can find no evidence to support the view that women with normal prolonged pregnancy should undergo routine induction of labour at 42 weeks’ gestation” (1059). In their prospective study comparing women routinely induced at 42 weeks and women allowed to await

spontaneous labor, they found that, when the data was analyzed by parity, the single significant difference was a higher need for Cesarean section in multiparas in the first group (1062). Though the rates of Cesarean section were essentially the same in both groups of primigravidas, they attribute this to a bias caused by women in the second group (awaiting spontaneous labor) who needed or asked to be induced (1062). They say, “Routine induction to prevent prolonged pregnancy leads to an increase in the number of cesarean sections performed because of failed induction” (1061). Referring to a retrospective study comparing routine labor induction at 42 weeks with waiting for labor to start spontaneously, they say that induction did not improve outcome and increased the risk for cesarean surgery (1060). Finally, they say, “Routine induction of labour at about 42 weeks’ gestation is associated with an increased need for caesarean section in the first stage of labour and with a higher incidence of asphyxiated infants” (1062).

Cardozo, Fysh, and Pearce also say that, based on Apgar scores or meconium in the trachea or pharynx, the study “failed to show any difference in the neonatal outcome” (1062). Further, babies born to mothers who were routinely induced at 42 weeks had a “significantly increased need for intubation” (Cardozo, Fysh, and Pearce 1062). Cord pH was also measured for the last consecutive babies in the study, accounting for more than 45% of the total infants in the study (Cardozo, Fysh, and Pearce 1062). According to Cardozo, Fysh, and Pearce, this result, coupled with the heightened need for intubation, “suggests that asphyxia is more likely to result from routine planned induction of labour than conservative management” (1062).

Augensen et al. say that, in their study, delaying labor induction until 43 weeks did not unfavorably affect mothers and babies (1194). They say, “There was no evidence that the infants had suffered from lack of oxygen or nutrients” during the last week of pregnancy (1194). They conclude that, concerning safety for pregnancies around 42 weeks gestation, the results of their study “do not

warrant recommending” either induction or continuing the pregnancy an extra week (1195).

However, they “now postpone induction of labour in post-term cases, as the risk in monitoring the natural course, certainly up to day 308 [44 completed weeks], seems minimal” (1195).

### C. Other Considerations

Amis states that suspicion of macrosomia “is not a medical reason for induction” (17).

Referring to three studies, she says that “inducing labor for macrosomia... almost doubles the risk of having cesarean surgery without improving the outcome for the baby” (17). She goes on to say that ultrasound is a poor predictor of macrosomia and that up to “70% of women who are told they are carrying a macrosomic baby are actually carrying a normal-weight baby” (17).

In a study cited by Iwanicki and Akierman, the rate of induction in a period of 10 years increased “from 7.5% to 26.5%” (2027). However, the rate of perinatal mortality did not change, “the forceps rate more than doubled”, and Cesarean surgery rates increased by more than 50% (2027).

According to Cardozo, “there is no ‘right time’ to induce nor any conclusive data on which to base a rational decision” (841). Davis’ quote from *Human Labor and Birth* is hardly neutral:

“While the prolongation of pregnancy beyond 42 weeks may have an adverse effect on neonatal outcome in some cases, fetal death is rare. Induction of labor does not improve results. What the latter practice does achieve is an increase in the rate of cesarean section because of failed induction. An uncomplicated postdates pregnancy is not an indication for induction of labor. Early delivery is necessary only when tests of fetal health show that deterioration is taking place” (87).

## **Conclusion 1: Minimize Routine Induction of Labor For Dates Only**

*Postdatism*, in and of itself, is not an indication for induction of labor, and, therefore, routine induction of labor for uncomplicated pregnancies performed simply because of gestational age should be minimized.

## 2. The Question of Determining Risk (RISK NEEDS TO BE PROVEN)

Lowdermilk and Perry write, “To ensure the safe birth of the fetus, it becomes important to determine whether the pregnancy is actually prolonged and also whether there is any evidence of fetal jeopardy as a result” (1140).

### A. Diagnosis of *Postterm* Pregnancy

Augensen et al. say that “the menstrual and pregnancy histories should be scrutinized to ensure that the pregnancy is truly past term” (1195). If gestational age has not been suitably documented, Iwanicki and Akierman say that diagnosing a pregnancy as *postterm* “is difficult, if not impossible” (2028). They say that “menstrual history was found to be unreliable in as many as 40% of pregnancies, and for this reason it is frequently of little help in establishing a diagnosis of post-term pregnancy” (2028). They claim that both the last menstrual period (LMP) and fundal height measurement are “of limited value in determining gestational age” (2028).

On the other hand, they say, “Ultrasound has been accepted as a reliable method of assessing gestational age” and, when used before 20 weeks, “will help to predict gestational age within approximately seven days” (2028). They claim that the rate of *postterm* pregnancy decreased to 1.1% in a particular study when it was diagnosed only in pregnancies where “both menstrual and ultrasound-determined dates exceeded 293 days,” which is 41 weeks and 6 days (2028). They say, further, that “routine use of ultrasound” would decrease the number of pregnancies that are

incorrectly diagnosed as *postterm* and, therefore, decrease “the risk of inappropriate intervention” (2028).

## B. Fetal Testing

Korte and Scaer write that many doctors advocate induction “only when the risk of continuing the pregnancy is greater than the risk of inducing labor and delivery” (114). They go on to provide a list of situations in which the continuation of a pregnancy would threaten the life or well-being of the mother or baby; this list includes “an overdue pregnancy (postmaturity)” but qualifies this with “where a danger to the fetus has been *proven*” (114). Simkin, Whalley, and Keppler say that in the case where a fetus is “ready to be born, but for unexplained reasons, labor does not begin on time”, fetal postmaturity could occur and the “aging placenta” might not provide adequate nutrition and oxygen to the fetus (34). “To determine if the post-date baby is post mature,” they say, “tests of fetal well-being and placental function are performed” (34).

However, Korte and Scaer write that, even if a pregnancy is thought somewhat certainly to be prolonged, current assessments of the well-being of the fetus are not very helpful in ascertaining whether the pregnancy is at risk (158). They quote Iain Chalmers and Martin Richards from *The Benefits and Hazards of the New Obstetrics*:

“It has not been possible to demonstrate any striking advantage or disadvantage of a widened use of the induction of labor. The truth of the matter is that we are ignorant about the circumstances in which the benefits of induction outweigh the disadvantages and are likely to remain so using the research techniques employed so far” (114).

Hussain et. al. state that no tests currently exist to determine whether continuation of pregnancy or induction of birth would be best or to ascertain the optimal time for induction (2). When

“the literature for all current tests” was examined, only fetal movement counting was determined to be of “possible benefit” (Korte and Scaer 158). Korte and Scaer quote Kirkwood Shy from the University of Washington School of Medicine:

“Unfortunately, the available clinical tools have not had adequate evaluation to determine reliably whether or not they do more harm than good. I believe that we have promised patients too much with obstetric testing. Under almost all circumstances, including postdatism, outcomes are overwhelmingly good, and we credit ourselves and “modern medicine” with these results” (158).

On the other hand, according to Davis, a number of assessments exist to help determine the well-being of the fetus in a postdate pregnancy (87). First, the mother can count fetal kicks; Davis recommends doing fetal kick-counts for an hour each day after the mother’s largest meal and says that the mother should be able to count 8-10 movements during that time (87). Second, the nonstress test (NST) assesses variations in the fetal heart rate caused by the fetus’ own movements; when the fetus moves, its heart rate is supposed to accelerate moderately (Davis 87). An external monitor can be used in a hospital to perform the NST, or a midwife can use a fetoscope for 20 minutes to assess fetal heart rate and movement (Davis 87). Davis says, “In recent years, the validity of the NST has been called into question as no definitive correlation has been shown between negative findings with this test and fetal outcome; nevertheless, it remains standard of care for postdatism” (87). Third, ongoing ultrasounds beginning at 41 weeks or “careful uterine palpation” done every week by the same caregiver can assess for reduced amniotic fluid volume, which Davis terms “concerning, especially in combination with a poor nonstress response” (Davis 87-88). She says, “There is less than a 15 percent margin of error in this case” (88). Finally, the biophysical profile (BPP) combines the three assessments mentioned above with assessments of fetal breathing movements and muscle tone via



ultrasound (Davis 88). BPP testing usually starts at 41 weeks, is done twice a week, and, according to Davis, is the “[c]urrent medical protocol for postdatism” (88). Zero to two points are given to each of the five categories in the test (fetal movement count, NST, volume of amniotic fluid, fetal breathing movements, and fetal muscle tone); 10 points is the highest score, and a score under 7 is deemed to indicate induction of labor (Davis 88). Advising midwives in cases of *postdatism*, Davis says to “consult with backup, leave well enough alone, or, assuming the head is well into the pelvis, recommend home-based induction,” the choice being dependent on the midwife’s assessment of the mother and baby in lieu of a biophysical profile (88). She adds, “Induction might also be wise if the baby is getting a bit large for the mother’s dimensions; check carefully for fetal overlap, and beware of the previously engaged head rising up in the pelvis” (88).

Further, Simkin, Whalley, and Keppler say that if “prolonged pregnancy” is “suspected or known, the mother and fetus are watched closely,” and if it seems that the continuation of the pregnancy could harm either, labor is begun (261). Lowdermilk and Perry say that “some authorities” advocate labor induction at 41 to 42 weeks, while others allow continuation of pregnancy up to 43 weeks provided fetal well-being is assessed through testing and test results are typical (1025). They say tests are usually done once or twice per week and could include daily counting of fetal movements, NSTs, assessments of amniotic fluid volume, contraction stress tests (measurement of fetal heart rate while inducing contractions), BPPs, and Doppler flow measurement (1025).

In light of the difficulty and possible expense of assessing “post-term” pregnancies, as well as the fact that accurate dating and easy induction are not guaranteed for such pregnancies, Iwanicki and Akierman say, “A practical and inexpensive fetal monitoring system is required” (2029). Their list of assessments that “have been used with variable success” include “fetal movement charts, non-stress tests, contraction-stress tests, ultrasounds with assessment of amniotic fluid volume or biophysical

profile” (2029). They say that, according to the majority of authors, testing should begin at least by the 42<sup>nd</sup> week (2029). After the 42-week mark, Iwanicki and Akierman advocate basing the decision to induce on the favorability of the cervix (2029). They say that, with a favorable cervix and well-documented dates, “the risk of failed induction is small” and inducing labor would avoid the high expenses of continuing fetal testing (2029). However, in the case of an unfavorable cervix or uncertain dates, they say that fetal testing should determine whether to induce (2029). Fetal movements should always be recorded and the fetus assessed without delay if they decrease (2029). “Non-stress tests, alternating with ultrasound examination with biophysical profile every three to four days, will provide reliable, though not infallible, monitoring” (Iwanicki and Akierman 2029). They say that if a non-stress test returns abnormal results, an assessment of the biophysical profile via ultrasound should be performed (2029). If those results are non-reassuring, they advocate labor induction (2029).

Iwanicki and Akierman also advocate “prompt induction” when oligohydramnios is found via “physical examination, and confirmed on ultrasound examination at term or post term” (2029). They say that an absence of “any single vertical pool of amniotic fluid measuring over 3 cm on ultrasound examination” would be considered oligohydramnios (2028) and that an assessment of amniotic fluid volume should be attempted at each antenatal appointment (2029). They state that “oligohydramnios is almost always present” when variable decelerations of the fetal heart rate appear on a non-stress test; for this reason, such a heart rate pattern indicates amniotic fluid volume assessment via ultrasound (2029). Further regarding fetal testing, they say that performing a Cesarean section without trying to induce labor is best “if fetal well-being is compromised as demonstrated by non-stress test, biophysical profile, contraction stress test, or cordocentesis with analysis of blood pH and gases” (2029).

Iwanicki and Akierman make several conclusions, many in support of fetal testing: 1) all expecting mothers should have an ultrasound before 20 weeks for dating purposes and another at 32 weeks to screen for intrauterine growth retardation; 2) all expecting mothers “should observe and record fetal movements daily after 24 weeks gestation”; 3) assessment of amniotic fluid volume should be performed via palpation at each antenatal appointment, especially “at term and post term”, and “ultrasound examination should be performed if oligohydramnios is suspected”; 4) labor should be induced if oligohydramnios exists as demonstrated by ultrasound; 5) “if a pregnancy continues beyond 41 weeks, a non-stress test should be performed”; 6) with a favorable cervix at 42 weeks, “induction of labour can be considered”; 7) with an unfavorable cervix at 42 weeks, monitoring should be started twice a week, with non-stress tests rotated with biophysical profiles, and labor should be induced if either yields non-reassuring results; 8) “induction should also be considered once the cervix becomes favourable” (2029).

According to Augensen et al., “publications” contemporary to their study propose that amniotic fluid volume assessment via ultrasound along with NSTs “are the best markers of fetal condition in post-term surveillance” (1195). Though assessing the well-being of the fetus in a “prolonged pregnancy” is not easy, Cardozo, Fysh, and Pearce note a report of “the value of ultrasonically measured amniotic fluid columns” (1062). They state that “routine use of a two stage ultrasound screening procedure will detect over 80% of cases of growth retardation,” enabling these cases to be recognized before term (1062). They suggest that “the lower prevalence of fetal distress in labour together with the lower prevalence of meconium staining of the amniotic fluid may be due to our increased ability to detect pregnancies at risk before birth” (1062).

On one side, doubt about the efficacy of fetal testing in determining risk is coupled with, according to Korte and Scaer, the assurance of good outcomes in most cases of postdatism; on the other side, fetal testing is said to aid in assessing the well-being of the fetus and deciding on best care.

Everyone agrees that it is worth running the risks of Pitocin when to continue the pregnancy would threaten a life, but evidence that “benefits outweigh risks” in the preponderance of induced or augmented labors being performed is non-existent (Korte and Scaer 116). In light of the fact that many women desire little interference in birth, Cardozo says “the most acceptable management of post-term pregnancy seems to be increased fetal surveillance” (840). She says, “The best policy is probably to offer increased fetal surveillance after 42 weeks (or earlier if risk factors are present) and to terminate the pregnancy if adverse features occur” (841). The majority of opinions seem to favor fetal testing, and surveillance of both mother and baby can assist in reserving induction of labor for cases in which the well-being of mother or baby depends upon immediate delivery.

### **Conclusion 2: Reserve Induction of Labor for Cases of Necessity**

When pregnancies are properly and thoroughly dated and diagnosis of prolonged pregnancy is reserved for truly prolonged pregnancies and when fetal testing is used to ascertain the risk of prolonged pregnancy, the ability to reserve induction of labor for cases of necessity where risk has been proven is increased, to the benefit of mothers and babies.

## **VII. SUMMARY**

As Cardozo says regarding routine induction of labor, “A fixed cut off point seems unnecessarily prescriptive. Each case needs to be considered individually and timing of delivery should be based on the woman’s risk factors” (840-841). Iwanicki and Akierman say, “Careful

clinical management, making use of ultrasound examination and fetal heart-rate monitoring, has been found to be sufficient to ensure optimal perinatal outcome in the post-term pregnancy without the need for routine induction of labour” (2027). Augensen et al. say, “A policy of vigilant non-intervention up to the 44<sup>th</sup> completed week of pregnancy does not appear to jeopardize mother or fetus” (1192).

A policy of no routine induction of labor for dates only and of fetal testing to ascertain whether risks exist seems to be the best method of care for women with prolonged pregnancies and their babies. After all, as said by an editor of *Lancet*, ““The timing of spontaneous delivery is controlled by complex mechanisms which are still incompletely understood... and which have as their end point the delivery [of the baby when] survival of the newborn is most likely”” (Korte and Scaer 116). Cardozo, Fysh, and Pearce say that they are glad to agree with Aristotle “that prolonged pregnancy is a variant of normal and should be treated as such” (1062).

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