Length of Cook Catheter Placement and Induction of Labor

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Partners Human Research Committee Detailed Protocol

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Study Title: Length of foley catheter placement and induction of labor: a randomized controlled trial

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Background and Significance

Induction of labor occurs in 24% of pregnancies in the United States (Hamilton). There are many maternal and fetal indications for induction of labor at various gestational ages of pregnancy. Induction of labor consists of initial cervical ripening followed by oxytocin. Cervical ripening helps the cervix soften, thin and dilate. There are multiple agents for cervical ripening including pharmacologic and mechanical dilation. Phamacologic agents include prostaglandins and oxytocin. Mechanical ripening most commonly refer to a foley catheter balloon device. Mechanical methods have been associated with lower rates of cesarean section compared with oxytocin alone (Boulvain). Previous studies have compared foley catheter placement for 12 vs. 24 hours and showed 12 hours decreases time to delivery (Cromi). Recently, studies have looked at the efficacy of dual induction agents with combination of oxytocin and foley catheter with time to delivery (Levine).

The cook catheter device, a type of foley catheter used for mechanical dilation, is a silicone double balloon catheter that can be inflated to 80mL/balloon. Per device guidelines it should not be left in place for more than 12 hours. Given these instructions the balloon is most often removed at 12 hours or spontaneously when it falls out given cervical dilation during the induction process.

Currently there are no studies that evaluate the time to delivery in women with the foley catheter removed at 6 hours vs. 12 hours. Our theory is that the benefit of the foley catheter is within the first 6 hours and we will study whether there is faster time to delivery in this intervention group.

This study has potential benefits for both individuals, hospital efficiency, and healthcare costs in the future. Longer inductions are associated with higher rates of postpartum hemorrhage and infection, therefore decreasing induction length would hopefully limit these labor complications. By decreasing the length of time for induction of labor, hospital and efficiency and healthcare costs would likely improve. Patients in the future would benefit from the knowledge gained in this trial if labor inductions are shorter with only 6 hours of a foley catheter placement and labor induction protocols change as a result.

Specific Aims

The objective of our study is to compare the time to delivery in women who undergo induction of labor with foley catheter and oxytocin for six vs. twelve hours. Our

hypothesis is women who undergo an induction with foley catheter for 6 hours will have a shorter time to delivery.

Subject Selection

Our study population will include women 18-50 years of age at term (37-41 6/7 weeks) with a singleton gestation in cephalic presentation who are undergoing induction of labor. Both nulliparous and multiparous women will be included. Women will need to have a bishop score <6 or cervical dilation <2cm with intact membranes to be included, as these are the women currently being offered cervical ripening prior to labor induction. Women will be excluded if there is a contraindication to vaginal delivery. Women with history of a prior cesarean section will be excluded given their management may differ after removal of the foley catheter. Non-English speaking women will also be excluded given the length of time for induction on labor and delivery and inability to guarantee 24 hour interpreter services.

Women will be recruited from the Maternal Fetal Medicine and general Obstetrics clinics at Brigham and Women's Hospital. They will be counseled in the office by their provider when an induction of labor is discussed, based on their cervical examination.

Subject Enrollment

Women will be enrolled from clinic prior to induction of labor based on their cervical exam and need for cervical ripening. Typically, inductions are scheduled in clinic within the week prior. When a patient is being scheduled for an induction, and it is deemed that they will need cervical ripening, they are potential candidates for this trial. The process of informed consent will happen in the clinic if the patient desires to participate in the study. The study staff and other selected physicians in clinic who have agreed to help with the study will consent the patient. Once consent is obtained, the subjects will then be randomized to either 6 vs. 12 hours with foley catheter. A random number generator will be used to randomize women in blocks of 10.

If a woman is unsure about her desire to participate she will be able to go home from clinic with time to consider participation. If this is the case, she will be consented when she presents for her induction of labor by the study staff.

Often times women at term are seen in clinic and the decision is made to proceed with induction on the same day. We propose that we are able to approach these women when they present to labor and delivery for induction. They will be given at least one hour to consider participation in the trial and to ask pertinent questions.

Neither the patients nor the health care providers will be blinded to the assigned treatment group due to practical limitations.

Study Procedures

Upon presentation to labor and delivery the participant will have a foley catheter inserted digitally or by direct visualization with a speculum, as per provider preference as both methods are commonly used. The uterine component of the balloon will be inflated to maximum 60mL. The catheter will be taped to the inner thigh with gentle traction.

Below is an image of cook catheter with both uterine and vaginal balloons inflated. In this study we will only inflate the uterine balloon (the distal balloon), following current standard practice on our labor and delivery unit.

In both groups participants will be started on a hospital-based oxytocin protocol. This protocol begins with 2 milliunits/min of oxytocin, increasing by 2 milliunits every 15 minutes until regular uterine contractions occur. The maximum dose of oxytocin is considered to be 30 milliunits per our current protocol.

The foley catheter will then be removed at 6 vs. 12 hours based on randomization. At that point health care providers will manage active labor per usual practice. Pitocin will be continued after foley removal, as is standard practice and health care providers many perform amniotomy at any point during the induction process with a recommendation for amniotomy when cervix more than 4cm dilated, consistent with literature demonstrating a shorter time to delivery with earlier amniotomy (Battarbee). Labor interventions are at the discretion of the healthcare provider. The participants will have continuous fetal monitoring throughout their induction, labor and delivery. The need for operative delivery or cesarean section will be at the discretion of the healthcare provider.

Biostatistical Analysis

The main outcome will be length of time to delivery. A subject's participation will end with outcomes 4 weeks following delivery.

Secondary maternal outcomes will be measured including cesarean delivery rate, time to active labor (>5cm dilated), delivery within 12 hours, delivery within 24 hours, maternal length of stay, and indication for cesarean delivery. We will also calculate a composite maternal morbidity outcome including estimated blood loss, higher-order laceration, blood transfusion, endometritis, wound infection, venous thromboembolism, hysterectomy, ICU admission or death. These outcomes will also be stratified by parity. We will also evaluate rates of analgesia in both groups.

A composite neonatal morbidity will be calculated including culture-proven neonatal sepsis, neonatal blood transfusion, hypoxic-ischemic encephalopathy, intraventricular hemorrhage grade 3 or 4, or therapeutic hypothermia. We will also analyze NICU admission, NICU admission for greater than 48 hours, and neonatal length of stay.

In the literature, the mean time to delivery with an induction of labor in 18 hours. A four hour reduction in time to delivery is considered clinically meaningful and has been used in prior studies evaluating induction of labor (Levine). A Type I α error of 0.05

was selected. Assuming 80% power and a two-sided P value we would need 71 participants in each group for total sample size 142. However, given that some patients will undergo cesarean section during their induction of labor, we will exclude cesarean section in a sensitivity analysis. Assuming that 20% of patients will have a cesarean section, we will include 89 women in each arm, 178 women total. For statistical purposes, intent to treat analysis will be performed. Non-parametric measures will be used for statistical analysis. These models will also be adjusted for parity.

Risks and Discomforts

Women may experience discomfort with foley catheter insertion, which will be handled with pain medication in a similar way to current practices on labor and delivery.

Because the foley catheter is routinely used for cervical ripening during labor induction on labor and delivery we think that there is minimal increased risk from the study. However, by limiting the foley catheter to 6 hours, the length of time of cervical ripening is limited. Upon removal of the catheter at 6 hours the cervix may not be ripened and therefore increase the risk of prolonged induction and ultimately cesarean section. If the intervention group is associated with longer length of time to delivery it may also be associated with increased blood loss and risk of infection, which are known risks of prolonged induction. Our study, however, allows physicians to manage labor as deemed appropriate after foley removal. Thus, if cervical ripening is felt to be inadequate, alternative cervical ripening agents (such as misoprostol) could still be used in appropriate candidates. Moreover, we feel it is most likely that the 12-hour foley group (the current standard of care) will have longer labor inductions, not the 6-hour experimental group, consistent with prior studies showing that labors were longer with 24 hour foley placement rather than 12 hour placement (Cromi). Also, our clinical experience is that when foley balloons are actively managed (i.e. the patient is checked vaginally sooner than 12 hours and tension is applied to see if the foley is ready to come out) most women achieve adequate cervical dilation much sooner than the maximum of 12 hours.

Potential Benefits

Because this study is a randomized controlled trial, there is no direct benefit to individuals. Given the nature of the study we do not know if, and which treatment is better. Furthermore, the study is randomly allocated so there is an equal chance of the patient being in either treatment arm.

There are however many benefits for the healthcare system in the future. By determining the faster method for induction of labor we may find that risk of infection and blood loss are lessened. The fetus also benefits by shorter induction times by limiting the time of intrauterine stress during labor and delivery. Healthcare cost would benefit from the information gained in this study by decreasing hospital stays. Currently, the most effective method of inducing labor remains unknown.

Monitoring and Quality Assurance

The principal investigator will review the entries for each participant to ensure they are complete. We will not perform any interim analysis, as we feel there is minimal risk from the study protocol and would not stop the study early. When adverse events

occur they will be reported to the Partners' IRB within 5 days with a detailed description of the event as described in the guidelines for adverse events reporting. Serious adverse events (severe hemorrhage, maternal death, neonatal death, neonatal hypoxemic encephalopathy) will be reviewed by the head of labor and delivery and the study staff to ensure the outcome is not related to the study protocol.

References

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