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The Iowa PERINATAL Letter

External Cephalic Version

External cephalic version (ECV) is the alteration of fetal presentation by substituting the cephalic and breech poles through abdominal manipulation. The goal of ECV is to decrease breech presentation at delivery, as well as to decrease the need for cesarean section caused by breech presentation. ECV has been described in the medical literature since Hippocrates and gained popularity in the early 20th century. It then lost favor in the 1960's and 70's when reports of maternal and fetal complications circulated. During this time vaginal breech delivery was considered acceptable and the need for ECV was questioned. In ad-

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Neonatal Resusitation Program: What's New?

After a nearly three year period of evidence evaluation and scientific review, new neonatal resuscitation guidelines were published late in 2005 *(Circulation 2005; 112 (24): IV 188).* Based on these guidelines the Neonatal Resuscitation Program has recently been revised. Materials for this new program were made available this spring and the new course will be taught by all instructors beginning January 2007. The purpose of this article is to describe some of the major changes in the new guidelines

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External Cephalic Version

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dition, obstetricians noted high rates of spontaneous conversion to vertex as well as spontaneous reversion to the breech presentation, as ECV was often being performed before term due to an increased success rate earlier in gestation.

Breech presentation occurs in 3-4 percent of term pregnancies and increases significantly to 7 percent at 32 weeks and 25 percent at 28 weeks. Breech presentation has been considered a marker for poor perinatal outcome. A study looking at the incidence of mild childhood handicap in infants with breech presentation was noted to be 19.4%, regardless if vaginal breech delivery or elective cesarean section were performed. Breech presentation may reflect fetal anomaly, maternal uterine or pelvic anomaly, prematurity or a chance occurrence.

The Term Breech Trial documented significant reductions in neonatal death and serious neonatal morbidity when breech fetuses were delivered by planned cesarean section as compared to planned vaginal breech delivery. This study was published in 2000 and since that time approximately 95 percent of term breech pregnancies have been delivered by cesarean section. This is another cause for the increasing primary cesarean section rate and another reason to revisit ECV and its inherent risks and benefits.

Who Is a Candidate for ECV?

Currently, patients at 37 weeks gestation and beyond with a fetus in the breech presentation are candidates for ECV. Preterm version attempts have been associated with high rates of reversion as well as high rates of spontaneous conversion in patients without ECV. The Cochrane Database evaluated 3 studies on ECV before term and found no significant effect on noncephalic presentation or cesarean section. This is in contrast to the Cochrane review on ECV at term which reviewed 5 studies with 433 women and showed a RR of 0.38 for noncephalic presentation and RR 0.55 for cesarean section. There is limited information on this topic and the University of Iowa is currently participating in an international study on preterm versus term ECV.

What Are the Contraindications for ECV?

Contraindications to ECV would include any indication for a cesarean delivery such as placenta previa. Other contraindications would include third trimester bleeding, fetal anomalies, non-reactive fetal heart tracing, rupture of membranes and multifetal gestation. ECV has been studied in twins after the delivery of the first twin and has been successful in that scenario. There has also been a small randomized control trial of women with a prior cesarean section who underwent ECV which found comparable success rates and no serious adverse events. Despite this study, the risk of uterine rupture in these women is unknown and further research is needed before recommendations for ECV in women with prior cesarean section can be made.

What Is the Likelihood of Success?

A review of ECV in the United States by Zhang found the average success rate to be 65%. There is wide variability of success between studies 35-86%. There are several factors that have been associated with ECV success with the most significant being parity. In comparing nulliparas with multiparas there is nearly a doubling of the success of ECV. There is an inverse relationship between ECV success and gestational age. Placental location, amniotic fluid volume, fetal position, maternal weight, estimated fetal weight and engagement of the fetal pole have all been factors associated with the success of ECV.

What Are the Risks with ECV?

The largest review which included 44 studies and 7377 patients found the most common complication of ECV to be transient fetal heart rate abnormalities (5.7%). The risk of placental abruption, emergency cesarean section, vaginal bleeding, and perinatal mortality were less than 1 percent combined. Because of the risk of alloimmunization, Rhogam is recommended for non-sensitised Rh negative women following ECV. There currently is not enough evidence from randomized controlled trials to assess complications of ECV. It is important to note that risks associated with breech presentation at term include prolapsed cord and the risks associated with unplanned breech vaginal delivery. Multiple retrospective case control studies have found an increased risk of intrapartum cesarean section in successful ECV compared to women without prior breech presentation, with RR 2-4. Pain associated with ECV averaged 5.7 out of 10 in one prospective study.

How Should ECV Be Performed?

Currently, prerequisites should include: gestational age of 37+ weeks, a normal ultrasound, a reactive non-stress test, consent, IV access and available anesthesia and operating room. Tocolysis prior to ECV has been studied and has shown variable results. All the randomized controlled trials on ECV utilized a tocolytic agent and existing evidence may support the use of tocolysis during ECV, particularly with nulliparaous patients. A randomized study of terbutaline on ECV noted the success rate to nearly double in the tocolyzed patients compared with controls. Because of this data Terbutaline 0.25mg SQ is often utilized for ECV. The use of spinal and epidural anesthesia has been inadequately studied and therefore cannot be recommended at this time. The primary concern being that increased force on the maternal abdomen could be applied and lead to an increased risk of abruption and perinatal morbidity and death.

Are Patients Interested in Avoiding Cesarean Section?

With elective cesarean section a hot topic these days, a valid question may be do women want to avoid cesarean section, or is breech presentation a reason to "allow" them a cesarean section. A study of Israeli women in 1995 found 54% willing to consider ECV and in a follow up study in 2001 only 24% were willing to consider ECV. During this time frame more women were aware of the procedure, but less were willing to consider it. There is very little data on pain and ECV and whether that is what deters patients from this procedure is unknown.

Where Do We Go from Here?

There are many questions left unanswered. Should ECV be performed prior to term gestation? Should ECV be performed in patient with a history of cesarean section? Should ECV be performed intrapartum? Despite all these questions we do have some answers. ECV at term is associated with a significant decrease in non-cephalic presentation at delivery, as well as a significant reduction in cesarean section. From observational studies it appears there is minimal risk associated with ECV when compared to the risks associated with breech presentation at term.

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Neonatal Resusitation Program: What's New?

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for neonatal resuscitation. Though the mechanics of the actual resuscitation program have changed little there are several procedures which have changed. Additionally there are changes in the NRP course which will be evident to providers as they recertify. The new guidelines are the most evidence based to date.

Temperature

Very low birth weight preterm infants are likely to become hypothermic during a resuscitative effort. Even a baby who is doing well in the delivery room is at risk of developing hypothermia! It is now recommended that additional warming techniques be used such as covering the baby in plastic wrapping and maintaining them under a radiant warmer. Conversely, in term babies or any baby who has possibly been subject to hypoxia-ischemia and is at risk for brain injury there is evidence that hyperthermia may worsen the extent of the brain injury. Therefore, it is now recommended that normothermia be achieved and that iatrogenic hyperthermia in resuscitated newborns be avoided. Further recommendations for therapeutic hypothermia to reduce the extent of brain injury following hypoxia-ischemia is not being recommended with the new guidelines as further clinical trials are needed to determine which infants would most benefit from this therapy.

The Use of Oxygen during Neonatal Resuscitation

Based upon available evidence there are now concerns regarding potential adverse effects of 100% oxygen on cerebral circulation and respiratory physiology in newborns. Conversely, concerns remain regarding the possibility of tissue damage from hypoxemia during resuscitation. Recent meta-analyses have demonstrated a reduction in mortality and no evidence of harm in infants resuscitated with room air versus those resuscitated with 100% oxygen, though some questions remain regarding the methods employed by some of these studies. Therefore, several possible approaches are now recommended. One is to use the standard approach to resuscitate with 100% oxygen. An alternative is to begin with less than 100% oxygen, however if the infant remains cyanotic after 90 seconds of positive pressure ventilation the oxygen administration should be increased to 100%. Importantly, in situations where supplemental oxygen is not available positive pressure ventilation should be administered with room air. This is particularly easy when using a self inflating bag.

For infants that are less than 32 weeks gestation there is a need to reduce excessive tissue oxygenation. In this case it is recommended that an oxygen blender be used together with a pulse oximeter during resuscitation. Positive pressure ventilation should begin with oxygen concentration between room air and 100%. This oxygen concentration should then be adjusted to achieve oxyhemoglobin concentrations between 90-95%. If the infant does not respond with a heart rate greater than 100 beats/minute then 100% oxygen is recommended. It is important to note that there is no convincing evidence that a brief period of 100% oxygen during resuscitation will be detrimental to the preterm infant although concerns have been raised.

Meconium

Based on a large randomized clinical trial there is no longer the recommendation that meconium stained infants be routinely suctioned at the perineum prior to delivery of the shoulders. Other recommendations regarding post delivery neonatal suctioning for meconium or meconium stained fluid remain unchanged.

Positive Pressure Ventilation

When an infant remains apneic or gasping or if the heart rate remains less than 100 beats/minute for 30 seconds after the initial steps of resuscitation, positive pressure ventilation should begin. Assistance should be called for at the beginning of positive pressure ventilation and should report heart rate and breath sounds as indicators of effective ventilation. I might also suggest that the use of an EKG tracing in the delivery room can be a very helpful and more reliable indicator of heart rate, which can guide one in the resuscitative efforts. Various devices for assisting ventilation are recognized in the new program. These include the flow controlled pressure limited mechanical device such as the Neopuff™, however a self inflating or flow inflating bag and mask remain the essential apparatus for achieving effective ventilation in most resuscitations. As an alternative to an endotracheal tube a laryngeal mask airway has been shown to be an effective alternative for assisting ventilation in newborns who have failed bag and mask ventilation, or endotracheal intubation with CO_2 detectors.

CO_2 Detectors

An important recommendation is for the use of a CO_2 detector. An increasing heart rate and CO_2 detection are primary methods for confirming endotracheal tube placement. A commonly used CO_2 indicator that is readily available goes by the trade name PediCap and is manufactured by Nelcor.* The use of a CO_2 detector immediately after placing an endotracheal tube is helpful in determining whether the endotracheal tube is indeed in the trachea. The manufacturer recommends that 6 good breaths be given prior to determining whether there is a colorimetric change. A yellow color indicates the detection of CO_2 and placement of the tube in the trachea. It should be noted that this does not confirm placement above the carina but only in the trachea and could indeed still be positive with a right mainstem intubation. However, if after 6 good breaths there is no indication of carbon dioxide, that is no change of color to yellow, the endotracheal tube should be immediately pulled out and bag and mask ventilation continued until another attempt at intubation can be performed.

Epinephrine

Best evidence now demonstrates that IV administration of epinephrine is preferred, however if endotracheal epinephrine is used a higher dose up to 0.1 mg/kg via the endotracheal tube may be considered. This results in a dose of up to 1 ml/kg of 1:10,000 solution. It is recommended that this be drawn up in a 3 ml syringe and administered all at once. It should be noted that it will take careful and continued positive pressure ventilation to distribute this volume of solution. The preferred method of administration of epinephrine is a dose of 0.1-0.3 ml/kg of 1:10,000 solution via an intravenous route, most likely via a low lying umbilical venous catheter.

Naloxone

Naloxone is not recommended during the primary steps of resuscitation. Indications for giving Naloxone require the presence of continued respiratory depression after positive pressure ventilation has restored normal heart rate and color, and a history of maternal narcotic administration within the previous 4 hours. The endotracheal route for Naloxone is not recommended and the intravenous route is preferred, although the intramuscular route is acceptable but will result in a delayed onset of action.

Chest Compressions

There are no new guidelines with regards to the administration of chest compressions which remain indicated for a heart rate that is less than 60 beats/minute despite adequate positive pressure ventilation for 30 seconds. As all readers of this letter are likely aware, there are two techniques for administering chest compressions, however I might add that it has been my observation that people participating in an actual resuscitative effort requiring chest compressions frequently do not provide enough pressure with their fingers or the two thumb method to adequately generate higher peak systolic and coronary perfusion pressures. I would like to remind the readers that it is possible to provide effective cardiac output and coronary artery perfusion with chest compressions in newborns. One must keep in mind that as they are doing those compressions that they are indeed the driving force for the infant's circulation. Medications that are administered or the volume administered during a resuscitative effort will not be circulated if the chest compressions are not of an adequate amplitude.

Discontinuation of Resuscitative Effort

Importantly, the new guidelines also make a statement regarding the discontinuation of resuscitative efforts. That statement being that after 10 minutes of *continuous* and *adequate* resuscitative efforts discontinuation of resuscitation may be justified if there are no signs of life.

Approximately 10% of newborns require assistance to begin breathing at birth and approximately 1% of all newborns require extensive resuscitation after delivery. The uniform approach to the resuscitation of infants is the most reliable way to assure safety of the newborn in the delivery room. In this era of standardization of best practices in order to provide optimal outcomes these new NRP guidelines will serve our many patients and providers well.

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