Birth: an evidence-based approach

Rachel Reed is an Independent Midwife and Lecturer; Jamie Peetze is Lecturer in Paramedic Science; and Margaret Barnes is an Associate Professor in Nursing, University of the Sunshine Coast, Queensland, Australia.

Email for correspondence: RReed1@usc.edu.au

Abstract

Paramedics are involved in transferring women during labour and must also be able to manage births occurring outside of the hospital setting. Prehospital obstetric incidents represent a significant proportion of large cost litigation claims in the United Kingdom (Dobie and Cooke, 2008). Therefore, it is important to have an understanding of the physiology of birth and how best to avoid unnecessary complications. Culturally, birth is perceived as a dangerous event, and birth in an unplanned setting can be a frightening experience for women and for others present. However, birth is a normal physiological process and in the absence of prior interventions, complications are uncommon (Walsh, 2007). This paper will discuss an evidence-based approach to the management of normal birth and provide recommendations for practice which will reduce the risk of complications occurring and potentially improve the experience for women.

Key words
- Paramedic
- Birth
- Evidence-based
- Intervention
- Labour

Accepted for publication 7 December 2009

Labour is traditionally categorized into three distinct stages (Goad and Dunstall, 2005). During the first stage of labour the cervix dilates in response to uterine contractions and pressure from the presenting part. In the second stage of labour the baby moves through the open cervix, into the vagina and is born. The third stage of labour involves the birth of the placenta and membranes. The entire birth process is regulated by the hormones oxytocin, beta-endorphin, prolactin, and the catecholamines. In terms of paramedic practice the important hormones to consider are oxytocin and the catecholamines.

Oxytocin

Oxytocin has been describes as the ‘hormone of love’ and plays an important role in human bonding and attachment (Odent, 2001). It produces feelings of relaxation, altruism, caring and protection. Oxytocin is released during sexual activity, breastfeeding and physical contact, such as massage. During labour oxytocin regulates uterine contractions, and prepares the mother for bonding with her baby. Oxytocin is produced in the hypothalamus located in the area of the brain known as the primitive brain. This primitive part of the brain needs to take precedence over the neocortex in order to allow the effective release of oxytocin during birth. Any stimulation of the neocortex can interfere with the functioning of the primitive brain, and the progress of labour. The neocortex is stimulated by: bright lights; language; expectations of rationality; the feeling of being observed or monitored; and fear and anxiety.

The hormone oxytocin (blue arrows) is formed in, and released by, the hypothalamus. As well as affecting the amygdala and emotions, oxytocin also regulates uterine contractions during childbirth and facilitates breast feeding.
Catecholamines
Catecholamine levels also increase during labour in response to the physiological stress associated with pain, anxiety and fear (Coad and Dunstall, 2005). If catecholamine levels become too high oxytocin production is inhibited and placental blood flow reduced, potentially slowing labour and leading to fetal distress. To enable the birth process to work effectively paramedics need to ensure that the birth environment remains calm; that privacy is maintained; and avoid unnecessary observations, questions and interventions. This may be challenging when the birth is happening at an unplanned location and there is little known about the woman's medical history.

Birthing position
Little is known about the positions women instinctively use to give birth, although there is some evidence that historically women birthed in upright positions and still do in many parts of the world (Kitzinger, 2000). The medicalization of birth resulted in women labouring on beds and using positions that benefited birth attendants (Donnison, 1988). Although particular birth positions do not appear to influence the duration of labour (Gupta et al, 2004), the use of upright, kneeling and lateral positions may reduce pain, abnormal fetal heart rates and perineal damage (Soong and Barnes, 2005; Ragnar et al, 2006; Altman et al, 2007). Semi-supine and squatting positions have been found to increase the risk of perineal damage (Mayerhofer et al, 2002; Shorten et al, 2002; Gottvall et al, 2007). Therefore, encouraging and supporting women to get into a left lateral or kneeling position may reduce pain and improve birth outcomes.

Pushing
As the baby descends into the vagina, contractions change and become more explosive (Baddock and Dixon, 2006). The woman begins to spontaneously push using her abdominal muscles to increase the downward force of contractions. When women are able to push without instruction they instinctively vary their pushing efforts to meet the needs of themselves and their baby (Rossi and Lindell, 1986; Roberts et al, 1987). For example, if contractions are long, women will take several breaths between pushes which helps to oxygenate the baby. However, women are often instructed to use Valsalva type pushing and encouraged to take a deep breath and forcefully bear down (Yildirim and Beji, 2008).

Valsalva pushing
The most common type of directive pushing uses breath-holding to increase and focus efforts. This is commonly known as the Valsalva manoeuvre. It involves taking a deep breath, holding it and straining downwards. However, it can reduce the woman's oxygen levels, and increase her carbon dioxide levels, with corresponding risks for the fetus. Valsalva pushing has been found to have a number of effects on women including: impeding venous return; increasing intrathoracic pressure (Taggart et al, 1992); raising intraocular pressure (Rafuse et al, 1994); increasing arterial pressure (Haykowsky et al, 1996); affecting flow velocity in the middle cerebral artery (Tieks et al, 1992); and altering body-fluid pH contributing to inefficient uterine contractions (Roemer and Vogel, 1994). This type of pushing is also associated with an increased risk of damage to the perineum (Albers 2006) and the pelvic floor (Schaffer et al, 2005). Valsalva pushing affects the baby by reducing placental blood flow and subsequently increasing the risk of hypoxia (Yildirim and Beji, 2008). Babies who are born following Valsalva pushing are more likely to be stressed and require extra support following birth (Knauth and Haloburdo, 1986; Yildirim and Beji, 2008). In addition to increasing the risks for mother and baby, this type of pushing may not reduce the duration of the second stage. Instead prolonged Valsalva pushing may prevent the normal gradual descent and rotation of the baby and lead to maternal fatigue and metabolic acidosis (Knauth and Holburdo, 1986).

Birth of the baby’s head
As the baby’s head crowns the intense sensations produced usually cause the woman to stop pushing and the baby is then born gently by the uterus contracting without the extra force of the abdominal muscles (Coad and Dunstall, 2006). Therefore, in most cases it is unnecessary to instruct the woman to stop pushing and pant. Attempts to manually flex the baby’s head to reduce the presenting diameter are ineffective and may place extra pressure on the perineum increasing the risk of trauma (Myrfield et al, 1997). Providing pressure to the baby’s head to slow the birth while supporting the perineum does not prevent tearing and may actually increase the risk of severe tearing (Mayerhofer et al, 2002). Reassurance and observation is all that is needed during the birth of the baby’s head.

The amniotic sac usually remains intact until the end of the first stage of labour (Coad and Dunstall, 2005). It protects the baby during contractions by reducing compression of the baby and cord, and it provides a barrier to infection. Occasionally the membranes remain intact after the baby’s head
When women are able to push without instruction, they instinctively vary their pushing efforts to meet the needs of themselves and the baby.

has birthed. This does not present a danger to the baby because the baby is unable to breathe while the chest is compressed in the vagina. If the membranes do not rupture after the birth of the head they can be gently torn and removed from the baby’s face while waiting for the birth of the body.

**Management of a nuchal cord**

It is common for babies to be born with the umbilical cord around their neck. The incidence of a nuchal cord at birth has been reported in a number of studies and found to occur in between 10% and 37% of births (Reed et al, 2009). In the majority of cases the cord is loose and is not associated with adverse outcomes (Adinma, 1990; Kumaria et al, 1992; Dhar et al, 1993; Larson et al, 1995; Nelson and Grether, 1998). It is unnecessary and uncomfortable to insert fingers into the vagina to identify cord and then loop it over the baby’s head (Reed, 2009). Handling the cord stimulates the umbilical arteries to vasoconstrict which may reduce blood flow to the baby (Coad and Dunstall, 2005), and pulling creates tension on the umbilical cord risking tearing and subsequent bleeding (Schorn and Blanco, 1991). Instead the cord can be unwound after the baby is born.

Occasionally the cord is tightly wound around the baby’s neck. Unlike a loose cord, a tight nuchal cord is associated with hypoxia at birth although not with long term complications (Adinma, 1990; Kumaria et al, 1992; Larson et al, 1995; Dhar et al, 1995; Nelson and Grether, 1998). However, it is unclear if hypoxia is caused by the tight nuchal cord, or by the common practice of cutting a tight cord prior to the birth of the body (Reed et al, 2009). Mercer et al (2005) suggests that a tight nuchal cord may compromise a baby during labour because compression of the cord during contractions can prevent normal blood flow and the correction of acid–base imbalance. When the cord is clamped and cut before birth, blood flow between the baby and placenta is completely interrupted, reducing the baby’s blood volume and oxygen supply. However, if the cord is left intact, once the baby is born the placental circulation can correct the acid–base imbalance. Any necessary resuscitation can take place with the assistance of placental circulation per fusing the baby and improving the blood volume and oxygenation.

Another risk involved in clamping and cutting a nuchal cord is the possibility of a shoulder dystocia occurring. Once the cord is cut a delay in the birth of the baby may result in morbidity or mortality. Ify et al (2001) carried out medicolegal reviews of nine cases where a nuchal cord was cut before a shoulder dystocia occurred. The cases resulted in serious injuries to the babies and malpractice actions against the doctors involved. The writers conclude that the practice of cutting the cord prior to the birth of the body is dangerous and should be avoided. A tight nuchal cord will not prevent the birth of the baby and Schorn and Blanco (1991) describe a ‘somersault technique’ that can be used to assist the birth of a baby with a tight, short nuchal cord without clamping and cutting. This involves keeping the baby’s head close to the mother’s thigh and assisting the baby’s body to ‘somersault’ out.

**Birth of the baby’s body**

Once the baby’s head is born, it is common to intervene and use guidance to assist the birth of the shoulders (Johnson and Taylor, 2005). There have been no studies to date examining this particular intervention. From personal experience this intervention is rarely necessary, particularly with a woman in an upright or kneeling position. In theory the use of this intervention may cause potential problems. For example, applying guidance too early may prevent the shoulders from rotating and result in a shoulder dystocia. Traction to the baby’s head may also cause damage
### Table 1. Summary of evidence-based practice

<table>
<thead>
<tr>
<th>Action</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure the environment remains calm and private. Avoid unnecessary observations, bright lights, and questions.</td>
<td>Stress and stimulation of the neocortex can interfere with oxytocin release and placental circulation.</td>
</tr>
<tr>
<td>Encourage the woman to get into a comfortable position, avoiding semi-supine and squatting positions.</td>
<td>Upright, kneeling and lateral positions reduce the risk of fetal heart rate abnormalities and perineal damage.</td>
</tr>
<tr>
<td>When the presenting part appears at the vulva reassure the mother that all is well and to follow her body. Do not instruct the woman to push.</td>
<td>Instinctive and undirected pushing improves the oxygenation of the baby and is respectful of the woman’s own ability to birth her baby.</td>
</tr>
<tr>
<td>As the head crowns observe the mother’s behaviour. Only suggest panting or stop her pushing if she is strongly bearing down and the head is advancing fast.</td>
<td>Women will usually stop pushing in response to crowning, thereby naturally slowing the birth of the head. Unnecessary directions may interfere with this instinctive behaviour.</td>
</tr>
<tr>
<td>As the baby’s head is born, observe and reassure the mother that all is well.</td>
<td>There is no need to do anything.</td>
</tr>
<tr>
<td>Observe for restitution of the head then rotation and descent with the following contraction. If the amniotic sac is still intact, tear the membranes and gently remove them from the baby’s face.</td>
<td>Rotation and descent of the head indicate that the shoulders have rotated in the pelvis and are not stuck. The sac might burst with the following contraction if left unruptured.</td>
</tr>
<tr>
<td>The baby’s body should deliver with the next contraction. Gently support the baby as the body is born. If the baby’s body does not descend ask the woman to push with her contraction. Only use gentle guidance if there is no further descent.</td>
<td>Most women do not require the use of guidance, especially if she is in the upright position.</td>
</tr>
<tr>
<td>Immediately place the baby skin to skin on the mother’s chest, dry and assess the baby on her chest.</td>
<td>Skin-to-skin contact will help the baby to transition to external life. It will also help the mother to release further oxytocin to facilitate the third stage. The baby will also be able to find the breast and feed.</td>
</tr>
<tr>
<td>Cover mother and baby with a warm blanket and transfer to hospital. Continue to observe vaginal blood loss and the condition of the baby. If the placenta delivers naturally place it in a bowl.</td>
<td>It is important to keep the baby warm. If the placenta does not deliver during the transfer to hospital, it can be delivered in hospital. Rubbing the uterus or pulling on the umbilical cord without an oxytocic drug might result in haemorrhage.</td>
</tr>
</tbody>
</table>

Care of mother and baby immediately after birth

After birth the umbilical cord continues to pulse for a number of minutes allowing the baby to establish breathing while still being oxygenated by the placenta (Mercer et al, 2005). Placing the baby skin to skin with the mother immediately facilitates a safe transition to external life (Dabrowski, 2007). Skin-to-skin contact regulates the baby’s heart rate, breathing and temperature. It also stimulates the mother to produce further oxytocin, thereby expelling the placenta and contracting the uterus to prevent bleeding. The baby can be gently dried and assessed while on the mother’s chest. Both mother and baby can then be covered with a warm blanket to maintain heat. There is no need to cut the cord and it can be left until after the birth of the placenta. The mother and baby can be transported to hospital together.
Skin-to-skin contact regulates the baby’s heart rate, breathing and temperature and stimulates the mother to produce further oxytocin.

in skin to skin contact. The baby may instinctively seek the nipple and attach to the breast. Most babies, like other mammals are capable of self-attachment to the breast, and given time require no external help.

The birth of the placenta may take up to an hour or more (Walsh, 2007) and is therefore likely to take place in hospital after transfer. All that is required from the paramedic is to ensure blood loss remains within normal limits during transfer and that baby remains warm and in skin to skin contact. Avoid rubbing the uterus unless there are concerns about blood loss. It is dangerous to pull on the umbilical cord to assist the birth of the placenta without first administering an oxytocic drug. Controlled cord traction without prior oxytocic drug administration can result in partial separation of the placenta and haemorrhage (Dim, 2009).

Conclusions
Paramedics must be competent in assisting women birthing outside of the hospital setting. An evidence-based approach to managing birth will not only reduce the chances of complications occurring but also improve the experience for the woman giving birth. Encouraging effective birth positions, allowing spontaneous pushing and avoiding unnecessary interventions will facilitate the natural process of birth. Understanding the underlying physiology of birth can help paramedics to provide a calm and safe environment in what can often be a stressful situation.

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