

The third stage of labor

- 1 Introduction
- 2 Components of care during the third stage
 - 2.1 Routine prophylactic use of oxytocics
 - 2.2 Comparisons of different oxytocics
 - 2.3 Clamping and division of the umbilical cord
 - 2.4 Controlled cord traction
 - 2.5 Intra-umbilical vein injection
 - 2.6 Nipple stimulation
- 3 Active versus expectant management of the third stage
- 4 Complications of the third stage
 - 4.1 Postpartum hemorrhage
 - 4.2 Retained placenta
 - 4.3 Inversion of the uterus
- 5 Conclusions

1 Introduction

After the climactic experience of giving birth to a baby, the delivery of the placenta (the third stage of labor) may seem tame and rather dull. This period is, however, a time of great potential hazard. Postpartum hemorrhage remains an important cause of maternal morbidity and mortality, particularly in developing countries. Retained placenta can necessitate manual removal; inversion of the uterus is a rare but frightening and life-threatening complication. The effects of care during this period can have important consequences. The aim of care during the third stage should be to minimize serious adverse effects, such as blood loss and retained placenta, while interfering as little as possible with physiological processes and interaction between mother and baby.

Routine or prophylactic care during the third stage involves a number of choices. The first is whether to adopt an 'expectant' (physiological) approach and manage complications only when they arise, or

SOURCE: Murray Enkin, Marc J.N.C. Keirse, James Neilson, Caroline Crowther, Lelia Duley, Ellen Hodnett, and Justus Hofmeyr. *A Guide to Effective Care in Pregnancy and Childbirth*, 3rd ed. Oxford, UK: Oxford University Press, 2000.

DOWNLOAD SOURCE: *Maternity Wise*™ website at www.maternitywise.org/prof/

© Oxford University Press 2000

to take a more active, pre-emptive approach using one or more of the components of 'active management'.

Expectant management involves watchful waiting, with no use of prophylactic drugs, cord traction, or fundal pressure. Maternal effort aided by gravity suffices for delivery of the placenta, and the umbilical cord is clamped and divided after the placenta is delivered. The components of 'active management' include: prophylactic use of oxytocic drugs (either oxytocin and/or ergometrine or prostaglandins); early clamping and division of the umbilical cord; and controlled cord traction for delivery of the placenta. Some caregivers may also apply fundal pressure.

In practice the two approaches are not always as different as they may appear to be at first. Those who adopt an active approach may differ among themselves in the components they use, as may those who adopt a mainly expectant approach. As a result of this overlap, evaluation of these packages of care is difficult and the results are not always easy to interpret.

2 Components of care during the third stage

2.1 Routine prophylactic use of oxytocics

While few would dispute the valuable contribution of oxytocic drugs in the *treatment* of postpartum hemorrhage, the routine prophylactic administration of these drugs to reduce the risk of postpartum hemorrhage has not been so universally accepted.

A large number of trials, including over 8500 women, have compared those who did or did not receive prophylactic oxytocic preparations (usually in combination with other, variable, components of active management). The available data suggest that routine administration of oxytocics cuts the risk of postpartum hemorrhage in half, and reduces the therapeutic use of oxytocics by 70%.

The effect of prophylactic oxytocics on retention of the placenta is still not clear. There is some suggestion that routine administration of oxytocics increases the risk of retained placenta, but this finding may reflect selective reporting of outcome data, or may be the result of chance.

Less than half the studies provided information about hypertension as a potential side-effect of oxytocic use; those that did showed a statistically significant hypertensive effect of oxytocics. More general data on blood pressure from other studies also suggest that the

prophylactic use of oxytocics, particularly ergometrine, leads to a rise in blood pressure.

The advantage of prophylactic oxytocics in terms of reduced risk of postpartum hemorrhage must be weighed against the rare but serious morbidity that has sometimes been associated with their administration. Maternal deaths from cardiac arrest and intracerebral hemorrhage have been attributed to ergometrine, as have non-fatal instances of cardiac arrest, myocardial infarction, postpartum eclampsia, and pulmonary edema. Serious morbidity related to prophylactic oxytocin is much less than with ergometrine. Because these events are so rare, the available randomized trials cannot provide meaningful estimates of the extent to which they may be attributed to oxytocic administration. Other rare adverse consequences of routine oxytocic administration include intra-uterine asphyxia of an undiagnosed second twin.

In theory, randomized trials should be able to provide useful information about more common, albeit less serious adverse effects, such as nausea and vomiting, and headaches. Unfortunately, little usable information on these is available from the trials. Apart from registering hypertensive effects, there have been few systematic attempts to quantify side-effects of oxytocic use. Ergometrine is known to lower serum prolactin levels, but few of the trials have investigated whether or not it interferes with breastfeeding. The two trials in which this was examined found no difference in breastfeeding at discharge from hospital.

Prostaglandins also have a powerful effect in stimulating uterine contractions. The injectable preparations are well established for treatment of severe or intractable postpartum hemorrhage. Their role for prophylaxis during the third stage, however, is less clear. They are expensive, and would need to be substantially better than oxytocics in order to be a cost-effective alternative. One small trial has compared intramuscular prostaglandin with placebo. This study suggests that prostaglandins may reduce the risk of postpartum hemorrhage and the need for therapeutic oxytocics, but the data are insufficient for any firm conclusions. Oral preparations are more promising, and these are discussed below.

2.2 Comparisons of different oxytocics

From the trials in which oxytocin has been compared with ergot alkaloids, usually ergometrine, the use of oxytocin was associated with a trend towards less postpartum hemorrhage, less delay in placental delivery, and fewer rises in blood pressure, although none of these differences achieved statistical significance.

Syntometrine, (a combination of ergometrine and oxytocin which was devised to take advantage of the more rapid onset effect of oxytocin and the more sustained effect of ergometrine) has a similar effect to ergot alkaloids used alone on the rate of postpartum hemorrhage. Syntometrine appears somewhat less likely than ergot alkaloids alone to be associated with a prolonged third stage. Only one small trial considered effects on blood pressure, with insufficient evidence to draw any firm conclusions.

Syntometrine reduces the risk of postpartum hemorrhage by 20% over oxytocin alone. This has been demonstrated by six trials, involving over 10 000 women. There was no apparent difference between the two drugs in the need for manual removal of the placenta or blood transfusion. Only half the studies reported possible side-effects, but in those that did Syntometrine was associated with a much higher risk of vomiting and raised blood pressure. These disadvantages may have been exaggerated by selective reporting. The few trials reporting Apgar scores, neonatal jaundice, and breastfeeding at discharge from hospital suggested no difference between the two agents on these outcomes.

Six trials with 1200 women have compared prostaglandins (intramuscular or rectal) with oxytocics. Because of the rarity of the outcome, these studies have been too small to assess whether prostaglandins are better or worse than oxytocics for minimizing the risk of postpartum hemorrhage, but they do suggest that intravenous prostaglandins may have more side-effects, such as vomiting, abdominal pain, and diarrhea. As injectable prostaglandins are also expensive, there seems little justification for further trials, particularly in developing countries. However, misoprostol, a prostaglandin analog, seems more promising. It has the advantages of being cheap, and can be used orally or rectally. A further potential benefit for developing countries is that, unlike oxytocics, it is stable at ambient temperature in tropical climates. Misoprostol is being evaluated in several ongoing trials, the largest of which is a comparison with oxytocin. The results of these studies will indicate whether misoprostol has any important advantages over oxytocics, but until these studies are complete misoprostol cannot be recommended for clinical use.

2.3 Clamping and division of the umbilical cord

Active management of the third stage of labor usually entails clamping and dividing the umbilical cord relatively early, before beginning controlled cord traction. Pre-empting physiological equilibration of the blood volume within the fetoplacental unit in this way may

predispose to retained placenta, postpartum hemorrhage, fetomaternal transfusion, and a variety of unwanted effects in the neonate, respiratory distress in particular. Delayed cord clamping results in a placental transfusion to the baby, amounting to between 20% and 50% of the baby's blood volume, depending on when the cord is clamped, at what level the baby is held before clamping, and whether or not oxytocics have been administered.

Several trials have compared different timings for cord clamping. They are difficult to interpret, however, as they used varying definitions of 'early' and 'late', reported different outcomes, and some of them were methodologically weak. Earlier cord clamping leads to higher residual placental blood volumes and heavier placentas, but these observations have no clinical relevance. The trials are too small for any reliable conclusions about possible effects of the timing of cord clamping on the frequency of postpartum hemorrhage.

Early cord clamping results in lower hemoglobin values and hematocrits in the newborn, but these effects are minimal at 6 weeks of age and undetectable by 6 months after birth. Neonatal bilirubin levels are lower in the babies after early cord clamping. This seems to be reflected in more clinical jaundice following delayed clamping, but this difference is not statistically significant.

This issue is of special interest in the care of preterm babies, where early clamping is often carried out to facilitate resuscitation. Theoretical considerations suggest that a delay of as little as 30 seconds may have important clinical benefits for these babies. This suggestion is supported by results from three small trials.

Allowing free bleeding from the placental end of the cord reduces the risk of fetomaternal transfusion, which may be important with regard to blood group iso-immunization.

2.4 Controlled cord traction

Controlled cord traction involves traction on the cord, while maintaining counter-pressure upwards on the lower segment of the uterus using a hand placed on the lower abdomen. There have been two trials in which controlled cord traction was compared with less active approaches, one of which sometimes entailed the use of fundal pressure. Controlled cord traction was associated with a lower mean blood loss and shorter third stage, but the trials provide insufficient data to warrant firm conclusions about its effects on either postpartum hemorrhage or manual removal of the placenta. One of the investigators noted that the umbilical cord had ruptured in 3% of the women

managed with controlled cord traction, and that women were more likely to find fundal pressure uncomfortable.

2.5 Intra-umbilical vein injection

Injection of oxytocin into the intra-umbilical vein at, or shortly after, cord clamping has been suggested as a way of encouraging placental separation, thereby speeding delivery of the placenta and reducing postpartum hemorrhage. The theory is that oxytocin stimulates contraction of uterine muscle, and/or the increased blood volume in the placenta encourages sheering from the uterine wall. The few trials evaluating intra-umbilical injection of either oxytocin or saline alone have been too small to assess the effects of these interventions on clinically important outcomes.

Intra-umbilical vein injection of oxytocin has also been compared with intramuscular oxytocin, but again these trials are too small for any firm conclusions.

2.6 Nipple stimulation

Immediate suckling after delivery to aid uterine contraction has been practised for many years, and may be used either in addition to various components of active management, or as part of expectant management. Stimulating the nipple in this way may increase release of oxytocin which may then stimulate uterine contractions, encouraging placental separation and reducing postpartum hemorrhage. A randomized trial of a policy of encouraging early suckling at deliveries attended by traditional birth attendants failed to demonstrate any reduction in postpartum hemorrhage. Alternative approaches include manual stimulation of the nipple by the woman, and breast pumps. These simple strategies for reducing the hazards of the third stage of labor merit further evaluation, particularly in developing country settings.

3 Active versus expectant management of the third stage

The effects of prophylactic oxytocics, early clamping of the cord, and controlled cord traction were considered separately in the controlled trials from which the above conclusions were drawn. If these three components are interdependent, as has been suggested, the conclusions of these trials must be viewed with caution.

Active management of the third stage (including all three of those elements) has also been directly compared to a policy of expectant, or physiological, management (which includes no prophylactic oxytocics, cord clamping after placental delivery, and no cord traction). Four out of the five trials comparing active with expectant management were carried out in centers where active management was the normal practice. The fifth was conducted in a setting where both expectant and active managements were in regular use.

In all of these trials, active management of the third stage of labor was found to be associated with important reductions (more than a halving) in the risk of postpartum hemorrhage, low hemoglobin levels postpartum, and use of blood transfusion. It was also associated with a shorter third stage and a reduction in the use of therapeutic oxytocics.

Some adverse effects have been observed. Active management results in an increase in nausea and vomiting, headache, and hypertension postpartum. Overall, manual removal of the placenta was more frequent with active management, but this effect was not statistically significant and was not observed in all trials. There was no clear effect on the risk of subsequent retained products requiring surgical removal. There was a trend towards less jaundice and fewer admissions to the special care nursery after active management, but the differences were not statistically significant and these outcomes were not reported for all trials. No effects on Apgar score at 5 min were detected. In the two trials that assessed breastfeeding, there were no differences either on discharge from hospital, or six weeks later.

Where the views of mothers have been sought, more seem to favour active management.

4 Complications of the third stage

4.1 Postpartum hemorrhage

The care for a woman with postpartum hemorrhage depends on a rapid but careful assessment of the cause, and prompt arrest of the bleeding before the situation becomes critical. If the source of the bleeding is traumatic, this will require surgical repair; if it is due to uterine atony, contraction of the uterus must be achieved by ensuring that the uterus is empty and well contracted.

Oxytocin and ergometrine have been the traditional first line approaches for achieving contraction of the uterus when the hemor-

rhage is due to uterine atony. Prostaglandins and prostaglandin analogs have also been used. Although the effectiveness of prostaglandins and their analogs for arresting postpartum hemorrhage due to uterine atony has not been demonstrated in controlled trials, their dramatic effect when all other measures have failed shows that these drugs are worthwhile. Injection of prostaglandins into the myometrium may obviate the need for uterine packing, internal iliac artery ligation, or even hysterectomy. Serious maternal side-effects have been reported following intramyometrial prostaglandin injection. The advantages must be weighed against the risks, and special attention paid to the doses used. More recently, rectal administration of a large dose of misoprostol (1000 mg) has been described for the management of postpartum hemorrhage. Thus far, there is little information on its effectiveness.

4.2 Retained placenta

The conventional treatment for retained placenta is manual removal following digital separation of the placenta from the uterine wall, usually under either general anesthesia, epidural, or spinal block. In areas where anesthesia is not available, analgesia with either an intravenous injection of pethidine and diazepam or paracervical block have been suggested as alternatives.

Other methods for encouraging separation of the placenta have also been proposed. The available evidence suggests that injection of oxytocin solution into the umbilical vein reduces the need for manual removal of the placenta, in comparison to either injection of saline alone or expectant management. It does not appear to affect the risk of postpartum hemorrhage. No evidence of any adverse effects of the oxytocin solution have been reported, although manual removal following oxytocin may be more difficult than usual because of a firmly contracted uterus. Trials have also evaluated the use of saline alone injected into the cord; no effect was found on the incidence of manual removal of the placenta. One trial has evaluated the injection of a prostaglandin solution into the cord, but it was too small for any conclusions to be drawn.

4.3 Inversion of the uterus

Inversion of the uterus is now very rare. It may occur as a result of excessive cord traction in the presence of a relaxed uterus, vigorous fundal pressure, or exceptionally high intra-abdominal pressure as a result of coughing or vomiting. Inappropriate cord traction without

counter-pressure to prevent fundal descent is said to result in the occasional case of uterine inversion. Treatment involves prompt replacement of the inversion, often facilitated by general anesthesia and/or tocolysis. Hemorrhage or retained placenta should then be managed as outlined above.

5 Conclusions

The routine use of oxytocic drugs in the third stage of labor will result in a reduced risk of postpartum hemorrhage, when compared with other techniques (including some components of active management) without a prophylactic oxytocic drug.

The evidence available provides no support for the prophylactic use of injectable prostaglandins or ergometrine alone. The use of Syntometrine (ergometrine + oxytocin) rather than oxytocin (10 units) is associated with a small (20%) reduction in the risk of postpartum hemorrhage, but at the cost of increased hypertension and vomiting. Prophylactic syntometrine is probably best avoided for women with pre-existing hypertension or pre-eclampsia. Otherwise, the choice of agent will depend on a balance between assessment of the woman's risk, the values attached to these competing risks, and her personal preferences.

Oral prostaglandin analogs, such as misoprostol, are promising for prophylaxis during the third stage, but cannot as yet be recommended for clinical practice. A large ongoing trial is comparing misoprostol with oxytocin.

The available evidence does not reveal any effect of early cord clamping upon blood loss or postpartum hemorrhage. Early cord clamping should be avoided in Rh-negative women, unless the placental end of the cord is allowed to bleed freely, because it increases the risk of fetomaternal transfusion. More information is needed about the effects of the timing of cord clamping for preterm babies. Simple strategies such as early suckling and nipple stimulation also merit further evaluation.

As a package, active management of the third stage has been clearly shown to have a significant protective effect against postpartum hemorrhage when compared to components of expectant management. The implications for practice depend on the relative weight placed on the different outcomes considered, and the personal preferences of the woman. In terms of postpartum blood loss, active management is clearly better. Depending on the oxytocic preparation used,

however, there is an increased risk of nausea, vomiting, and hypertension. In settings where postpartum hemorrhage is particularly hazardous, active management has potentially life saving advantages.

In addition to oxytocin and ergometrine, prostaglandins or a prostaglandin analog (when available) should be used for the treatment of severe intractable postpartum hemorrhage. Which preparation, dose, or route of administration is most effective has not yet been established.

Sources

Effective care in pregnancy and childbirth

Prendiville, W. and Elbourne, D., Care during the third stage of labour.

Cochrane Library

Carroli, G. and Bergel, E., Umbilical vein injection for management of retained placenta.

Gulmezoglu, A.M., Prostaglandins for prevention of postpartum haemorrhage.

McDonald, S., Prendiville, W.J. and Elbourne, D., Prophylactic syntometrine versus oxytocin for delivery of the placenta.

Prendiville, W.J., Elbourne, D. and McDonald, S., Active versus expectant management of the third stage of labour.

Other sources

Bullough, C.H., Msuku, R.S. and Karonde, L. (1989). Early suckling and postpartum haemorrhage: controlled trial in deliveries by traditional birth attendants. *Lancet*, 2, 522–5.

Irons, D.W., Sriskandabalan, P. and Bullough, C.H. (1994). A simple alternative to parenteral oxytocics for the third stage of labor. *Int. J. Gynaecol. Obstet.*, 46, 15–8.

Kinmond, S., Aitchison, T.C., Holland, B.M., Jones, J.G., Turner, T.L. and Wardrop, C.A. (1993). Umbilical cord clamping and preterm infants: a randomised trial. *BMJ*, 306, 172–5.

Nordstrom, L., Fogelstam, K., Fridman, G., Larsson, A. and Rydhstroem, H. (1997). Routine oxytocin in the third stage of labour: a placebo controlled randomised trial. *Br. J. Obstet. Gynaecol.*, 104, 781–6.