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# Comparison of active and expectant management on the duration of the third stage of labour and the amount of blood loss during the third and fourth stages of labour: a randomised controlled trial

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**Abstract**
*Background:* Postpartum haemorrhage is one of the most important causes of maternal death.
*Objectives:* To evaluate the effect of active management of the third stage of labour on the amount of blood loss in the third and fourth stages of labour, and the duration of the third stage of labour.
*Methods:* A randomised controlled trial was completed on 200 women who gave birth at a maternity unit in Iran. In the intervention group ($n = 100$), 10 IU of oxytocin was injected intramuscularly into the mother following birth of the anterior shoulder of the baby. After clamping and cutting the umbilical cord, the uterus was pushed upwards and posterior, while the cord was pulled down with constant and intermittent traction until the placenta was delivered. In the control group ($n = 100$), on observing signs of placental separation, the placenta was expulsed by maternal force. In both groups of women, blood loss was measured at birth using collecting devices, and drapes and sheets were weighed to estimate blood loss.
*Findings:* Mean blood loss during the third stage of labour was $216.93 \pm 165.16$ ml and $232.12 \pm 150.35$ ml in the intervention and control groups, respectively; the difference was not significant ($p = 0.49$). In contrast, mean blood loss during the fourth stage of labour differed significantly ($422.62 \pm 324.7$ ml and $327.27 \pm 255.99$ ml in the intervention and control groups, respectively; $p = 0.02$). The mean duration of the third stage of labour was less in the intervention group than in the control group ($4.69 \pm 5.51$ mins and $6.34 \pm 5.03$ mins; $p = 0.028$).
*Conclusions:* Active management did not decrease blood loss during the third stage of labour, but did decrease the duration of this stage. Active management was associated with increased blood loss during the fourth stage of labour. Due to conflicting results between studies, further research should be undertaken to determine the optimal method by which to manage the third stage of labour.


**Keywords** Third stage of labour; Fourth stage of labour; Postpartum haemorrhage; Active management; Placental expulsion; Oxytocin; Expectant management; Physiological management

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## Introduction

Postpartum haemorrhage (blood loss of $\geqslant$500 ml in the first 24 hours postpartum) is an important cause of maternal death and occurs in approximately 4% of vaginal deliveries (Maughan et al., 2006). Postpartum haemorrhage causes significant maternal morbidity and is associated with one-quarter of all maternal childbirth-related deaths globally (Gabbe et al., 2002).

Most cases of postpartum haemorrhage are caused by uterine atony, and one of the important risk factors for atony is prolongation of the third stage of labour (Combs et al., 1991). For this reason, prophylactic use of uterotonic drugs and active management of the third stage of labour have attracted considerable attention (Prendiville et al., 1988). The third stage of labour is the time from birth of the baby until delivery of the placenta. The volume of birth-associated blood loss depends on how long it takes the placenta to separate from the uterine wall, and how effectively the uterine muscle contracts in the immediate postpartum period (Maughan et al., 2006).

Active management of the third stage of labour refers to the administration of uterotonic medication to the mother after birth of the baby, early clamping and cutting of the cord, and controlled traction on the umbilical cord while awaiting placental separation and delivery. In contrast, expectant management of the third stage of labour (i.e. physiological management) is best described as a 'hands off' approach. The umbilical cord is not clamped or cut until it stops pulsating, separation of the placenta occurs without intervention, and the placenta is delivered spontaneously or aided by gravity (Prendiville et al., 2000).

In most studies which have compared these two types of management (Khan et al., 1997; Rogers et al., 1998; Prendiville et al., 2000; Brucker, 2001), active management has been shown to reduce the duration and the amount of blood loss during the third stage of labour. However, one study (Thilaganathan et al., 1993) showed that although active management decreased the duration of the third stage of labour, the amount of blood loss was not reduced in comparison with expectant management in women at low risk for postpartum haemorrhage. This study evaluated 193 women with spontaneous vaginal birth at term. Ninety women had physiological management and blood loss was measured objectively by comparing haemoglobin in labour with that on the third postpartum day. Due to the conflicting results between studies, it seemed that additional studies should be performed to determine the optimal method by which to manage the third stage of labour.

The purpose of the present study was to compare the effect of active and expectant management on the amount of blood loss during the third and fourth stages of labour, and also on the duration of the third stage of labour.

## Methods

This study was conducted at Fatemieh Hospital in Hamedam, Iran, between April and August 2004, and was approved by the hospital ethics committee. All women admitted to the labour ward ($n = 1032$) were evaluated for eligibility for this trial (Fig. 1). Eligible women ($n = 738$) were invited to participate in the study. Written informed consent was obtained from all participants. Inclusion criteria included the following: gestational age between 37 and 42 weeks; singleton pregnancy; live fetus; cephalic presentation; neonatal birth weight of 2500–4000 g; parity between one and five; maternal age $<$35 years; and vaginal birth. Exclusion criteria included the following: blood pressure $\geqslant$140/90 mmHg; placenta previa; placental abruption; a history of any bleeding during pregnancy; a history of curettage; caesarean section or any uterine scar; a history of postpartum haemorrhage; polyhydramnios; rhesus-negative blood group; signs or symptoms of maternal infection; prolonged rupture of membranes; known uterine anomalies; history of any drug use during labour; abnormal placentation (accreta, inccreta or perccreta); coagulation defects; instrumental deliveries; analgesia or anaesthesia for birth; haemoglobin concentration $<$11 g/dL; history of anticoagulant drugs; beta-mimetic medications during pregnancy; and prolongation of the first stage of labour $>$15 hours. Three hundred and fifty-two women who fulfilled the inclusion criteria on admission to the labour ward were assigned at random to the two groups using block randomisation. The letters 'A', 'B', 'C' and 'D' were allocated to sealed, sequentially distributed envelopes: 'A' and 'C' represented active management (intervention group) and 'B' and 'D' represented physiological management (control group). Each woman chose an envelope which was opened by the investigator, and according to the letters, the women were assigned to either the intervention group or the control group. One hundred and fifty-five women were allocated to the intervention group and 145 women to the control group. The women were followed from the time of birth to the

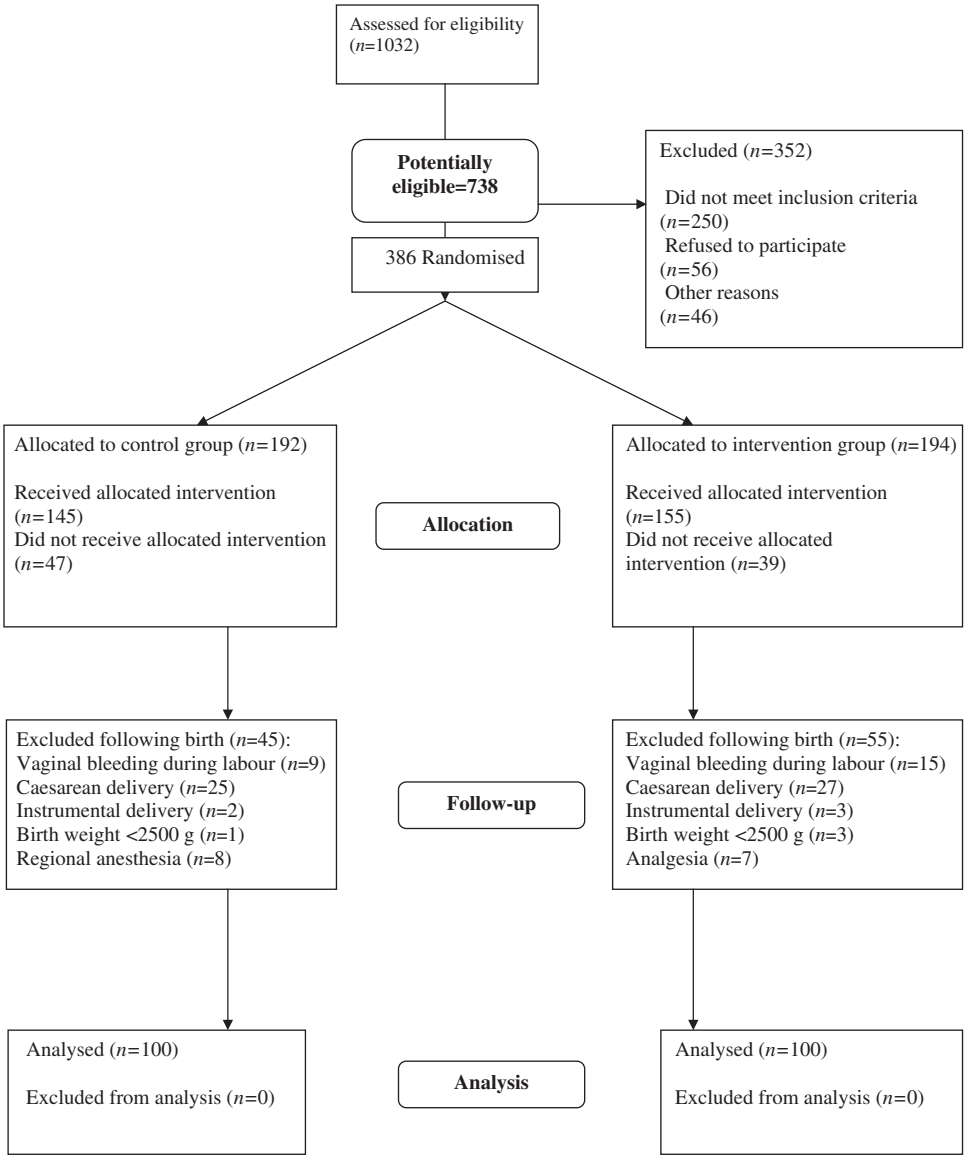


**Figure 1** Flow diagram of trial recruitment and follow-up.

end of the fourth stage of labour. Fifty-five women in the intervention group did not enter the study following randomisation as they no longer fulfilled the inclusion criteria: 15 women had vaginal bleeding during labour; 27 had a caesarean section; three women had an instrumental birth; three women gave birth to babies weighing $<2500$ g; and seven women had analgesia during labour. In the control group, 45 women did not enter the study following randomisation: 15 women had vaginal bleeding during labour; 25 women had a caesarean section; two women had an instrumental birth; one woman gave birth to a baby weighing $<2500$ g; and eight women had analgesia during labour. This left 200 women who fulfilled the inclusion criteria for randomisation: 100 were assigned to the intervention group, in whom the third stage of labour was managed actively; and 100 were assigned to the control group, in whom the third stage of labour was managed expectantly.

In the intervention group, 10 IU of oxytocin was injected intramuscularly into the mother following birth of the anterior shoulder of the baby. After the baby was delivered, the umbilical cord was clamped and cut, and intermittent and controlled traction was exerted on the umbilical cord (with the precaution of having a contracted uterus) until placental separation and delivery. At the same time, the uterus was pushed up with suprapubic pressure. The duration of the third stage of labour was calculated using a time recorder, and blood loss was measured using collecting devices and by weighing the drapes and sheets. The women were observed closely for one hour after delivery of the

placenta and the amount of blood loss during this stage was measured.

In the control group, all of the above measurements were performed. After birth of the baby, the placenta was delivered spontaneously by gravity and maternal expulsive forces. After delivery of the placenta, 10 IU of oxytocin in 500 ml of normal saline was infused.

The amount of blood loss during the third and fourth stages of labour, and the duration of the third stage were compared between the two groups. Statistical analysis was performed using Statistical Package for the Social Sciences software (SPSS, Chicago, IL, USA). Unpaired Student's *t*-test, $\chi^2$-test, regression analysis and covariate analysis were used to compare the findings.

## Findings

The women in the two groups did not differ in terms of maternal age, parity, gestational age, fetal gender, educational status, place of residence or employment (Table 1). Blood loss during the third stage of labour was $216.93 \pm 165.16$ ml and $232.12 \pm 150.35$ ml in the intervention and control groups, respectively, which was not statistically different.

Blood loss during the fourth stage of labour was $422.62 \pm 324.7$ ml and $327.27 \pm 255.99$ ml in the intervention and control groups, respectively, which was significantly different ($p = 0.02$). The third stage of labour lasted for $4.69 \pm 5.51$ mins and $6.34 \pm 5.03$ mins in the intervention and control groups, respectively, which was also significantly different ($p = 0.028$).

Uterotonic drugs were administered for excessive bleeding in 40 (40%) women in the intervention group and 27 (27%) women in the control group ($p = 0.05$). In addition, intravenous fluids were administered for excessive bleeding in 21 (21%) women in the intervention group and 10 (10%) women in the control group ($p = 0.034$).

Covariant analysis showed that after controlling for the effect of maternal age and parity on the amount of blood loss during the third stage of labour, there was no significant difference in the volume of blood loss between the two groups. This finding indicated that blood loss during the third stage of labour did not increase with increasing maternal age and parity. Inclusion of maternal age, parity and method of placental delivery (i.e. active or expectant management) in the regression analysis showed that only parity was associated with the volume of blood loss during the third stage of labour, according to the following formula:

$$\text{Volume of blood loss} = 269.3 - 22.69 \times (\text{parity}).$$

Regarding blood loss during the fourth stage of labour, covariant analysis showed that when controlled for age, there was a significant difference in mean blood loss between the two groups ($p = 0.02$). This finding indicated that blood loss decreased with increasing age; the greatest volume of blood loss occurred in mothers aged 15–19 years. In contrast, controlling for parity did not have a significant effect on blood loss during the fourth stage of labour between the two groups. This finding indicated that higher parity was not associated with increased blood loss during the fourth stage of labour.

Inclusion of maternal age, parity and method of placental delivery (active or expectant management) in the regression analysis showed that only parity was associated with the volume of blood loss during the fourth stage of labour, according to the following formula:

$$\text{Volume of blood loss} = 532.77 - 79.79\ (\text{parity}).$$

Regarding the duration of the third stage of labour, covariant analysis showed that when controlling for maternal age, the mean duration of the third stage was significantly different between the two groups ($p = 0.03$). The third stage of labour was longer for women over 25 years of age. Furthermore, controlling for parity, the duration of the third stage of labour was significantly

**Table 1** Patient characteristics.

| Characteristics | Study group | Control group | *p*-value |
|---|---|---|---|
| Maternal age (mean ± S.D.) | 22.99 ± 6.23 | 23.27 ± 5.12 | ns |
| Parity (mean ± S.D.) | 1.86 ± 1.16 | 2.09 ± 1.37 | ns |
| Gestational age (mean ± S.D.) | 39.46 ± 2.24 | 39.56 ± 1.4 | ns |
| Urban residency, *n* (%) | 38 (38%) | 31 (31%) | ns |
| Employees, *n* (%) | 2 (2%) | 1(1%) | ns |

S.D., standard deviation; ns, not significant.

different between the two groups ($p = 0.03$), indicating that for women with parity between one and five, the third stage of labour was shorter in the intervention group compared with the control group (minimal for gravidity of one).

When regression analysis was performed with the inclusion of maternal age, parity and method of placental delivery (i.e. active versus expectant management), the method of placental delivery was found to be related to the duration of the third stage of labour, according to the following formula:

$$\text{Duration of the third stage} = 3.03 + 1.65\ (\text{method of placental delivery}).$$

This finding indicated that the difference between the duration of the third stage of labour in the two groups was 1.65 minutes.

## Discussion

This study compared active and expectant management of the third stage of labour. Active management was found to shorten the duration of the third stage and increase the volume of blood loss during the fourth stage, but the volume of blood loss during the third stage was not reduced significantly.

The study by Thilaganathan et al. (1993), involving women who were at low risk for postpartum haemorrhage (similar to the present study), compared active and expectant management of the third stage of labour. They concluded that active management shortened the duration of the third stage of labour but did not reduce blood loss, which is in agreement with the present study. In contrast, Prendiville et al. (2000), in a Cochrane systematic review of four randomised controlled trials that compared active and expectant management of placental delivery, concluded that active management of the third stage of labour reduced blood loss and the duration of the stage; however, maternal adverse effects increased, including nausea, vomiting and blood pressure (probably because of the use of ergometrine), although no adverse fetal effects were noted. The authors recommended that the routine use of active management for the third stage of labour was superior to expectant management, and should be the method of choice for placental delivery in singleton pregnancies.

Prendiville et al. (1988), Presented similar results, and other authors (Chong et al., 2004; Fenton et al., 2005) have concluded that active management reduces blood loss during the third stage of labour, in distinct contrast with the findings of the present study. Magann et al. (2005) evaluated the relationship between the duration of the third stage of labour and postpartum haemorrhage. They concluded that by increasing the duration of the third stage for more than 18 mins, the amount of blood loss would be increased, and blood loss would be six times greater after 30 mins.

## Conclusions

This study found that active management of the third stage of labour had no significant clinical effect on the amount of blood loss. Due to conflicting results, additional studies with larger sample sizes should be performed to determine the optimal method to manage the third stage of labour.

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