



Uterine massage as part of active management of the third stage of labour for preventing postpartum haemorrhage during vaginal delivery: a systematic review and meta-analysis of randomised trials

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The first most common cause of maternal death worldwide is postpartum haemorrhage (PPH), responsible for an estimated 127 000 deaths annually. Failure of the uterus to contract adequately after childbirth is the most common cause of PPH. In the absence of timely and appropriate action, a woman can die within a few hours.¹⁻⁶

Risk of PPH is reduced by active management of the third stage of labour, which includes use of uterotonics after delivery, such as oxytocin, to stimulate contraction of the uterus,² and controlled cord traction.¹

It is still controversial whether uterine massage is effective in further reducing PPH.⁶ As a simple and inexpensive intervention, uterine massage, performed by repetitive massaging or squeezing movements after delivery of the placenta, could promote contraction of the uterus.

The aim of this meta-analysis of randomised controlled trials (RCTs) was to evaluate the efficacy of uterine massage as part of the active management of the third stage of labour in addition to oxytocin and controlled cord traction, in preventing PPH.

Methods

Search strategy

Electronic databases (i.e. MEDLINE, Scopus, ClinicalTrials.gov, EMBASE, Scencedirect, the Cochrane Library at the

CENTRAL Register of Controlled Trials, Scielo) were searched from their inception until May 2017. Search terms used were the following text words: 'PPH', 'cesarean', 'caesarean', 'delivery', 'labor', 'labour', 'postpartum hemorrhage', 'bleeding', 'general anesthesia', 'morbidity', 'mortality', 'review', 'oxytocin', 'effectiveness', 'guidelines', and 'bleeding' with filter for clinical trial. No restrictions for language or geographic location were applied. The electronic search and the eligibility of the studies were independently assessed by two authors (GS, CC). Differences were discussed with a third reviewer (VB).

Study selection

We included all published, unpublished, and ongoing RCTs comparing uterine massage, before or after delivery of the placenta, or both, with non-massage in the setting of either spontaneous or operative vaginal delivery. We planned to include only trials in which prophylactic oxytocin and controlled cord traction were used in both arms, as these interventions have been proven to be effective, and are considered standard of care.^{1,2} Quasi-RCTs (i.e. trials in which allocation was done on the basis of a pseudo-random sequence, e.g. odd/even hospital number or date of birth, alternation) were not included. Studies on uterine massage in the setting of caesarean delivery were also excluded.

Risk of bias

The risk of bias in each included study was assessed by using the criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions*. Seven domains related to risk of bias were assessed in each included trial as there is evidence that these issues are associated with biased estimates of treatment effect: (1) random sequence generation; (2) allocation concealment; (3) blinding of participants and personnel; (4) blinding of outcome assessment; (5) incomplete outcome data; (6) selective reporting; and (7) other bias. Review authors' judgements were categorised as 'low risk', 'high risk' or 'unclear risk' of bias.⁷

Outcomes

All analyses were carried out using an intention-to-treat approach, evaluating women according to the treatment group to which they were randomly allocated in the original trials.

The primary outcome was PPH, defined as blood loss ≥ 500 ml after trial entry.^{1–3} The secondary outcomes were blood loss ≥ 300 , ≥ 400 , and ≥ 1000 ml after trial entry; mean blood loss in millilitres after trial entry; use of additional uterotonics; and retained placenta.

Statistical analysis

The data analysis was completed using REVIEW MANAGER V. 5.3 (The Nordic Cochrane Centre, Cochrane Collaboration, 2014, Copenhagen, Denmark).

Meta-analysis was performed using the random effects model of DerSimonian and Laird, to produce summary treatment effects in terms of mean difference (MD) or relative risk (RR) with 95% confidence interval (CI). Heterogeneity was measured using Higgins I^2 , where $I^2 \geq 50\%$ was judged to be high.

The meta-analysis was reported following the Preferred Reporting Item for Systematic Reviews and Meta-analyses (PRISMA) statement.⁸

Results

Study selection and study characteristics

The flow of study identification is shown in Figure S1. Three RCTs, including 3842 singleton gestations, were found comparing uterine massage, in addition to oxytocin and controlled cord traction, versus no uterine massage.^{9–11} Statistical heterogeneity within the studies was high with $I^2 = 73\%$ for the primary outcome. Additional unpublished data from two trials were kindly obtained by the original authors.^{9,10}

The quality of the three included trials in general was low and all of them had high or unclear risk of bias in most of the seven Cochrane domains related to the risk of bias (see Figure S2A, B).

All RCTs included only singleton pregnancies in the setting of spontaneous vaginal delivery and none of them included caesarean delivery, operative vaginal delivery, or multiple gestations. Malpresentations were also excluded. One trial was a three-arm RCT.¹⁰ In this trial, women were randomised into 1:1:1 ratio in one of the following groups: oxytocin and controlled cord traction; uterine massage only; oxytocin, controlled cord traction, and uterine massage. For this review, the 'uterine massage only' group was excluded.

In one trial, uterine massage was performed by massage of the uterus every 10 minutes for 60 minutes. In the other two trials uterine massage was performed by massage of the uterus for 30 minutes. In all studies, uterine massage was performed transabdominally promptly after delivery of the placenta.

In all studies both the intervention and the control groups received oxytocin 10 IM for bleeding control, and controlled cord traction, as part of the active management of the third stage of labour (see Table S1).

Synthesis of results

Overall, uterine massage was not associated with a significantly lower risk of PPH [45/757 (5.9%) versus 30/745 (4.0%); relative risk 1.09, 95% CI 0.33–3.64; see Figure S3]. No statistically significant differences were found in the secondary outcomes including blood loss ≥ 300 , ≥ 400 , and ≥ 1000 ml, mean blood loss, use of additional uterotonics, placenta delivered ≥ 60 minutes after delivery of the baby, and incidence of manual removal of the placenta (see Table S2).

Given the lack of data, subgroup analyses, and sensitivity analyses were not feasible.

Discussion

Main findings

Only three RCTs comparing uterine massage with no massage, to reduce the risk of PPH as part of the active management of the third stage of labour, in addition to oxytocin and controlled cord traction, were found through a systematic review of the literature. Uterine massage was not associated with a significant reduction in the incidence of PPH, defined as blood loss ≥ 500 ml after delivery. Moreover, all other outcomes (other assessments of blood loss, use of additional uterotonics, and retained placenta) were not significantly different with uterine massage compared to no uterine massage. The quality of the included trials was low and the studies were different in terms of type of intervention (e.g. duration of uterine massage), and timing of blood assessment (30 versus 60 versus 120 minutes after delivery). Given these limitations, the quality of evidence for this review was judged as low.

Hofmeyr et al.⁶ in a previous Cochrane review analysed the efficacy of uterine massage to prevent PPH. They included only two trials^{9,10} evaluating the efficacy of uterine massage in the third stage of labour after vaginal delivery. Indeed, there are no trials on uterine massage at the time of caesarean delivery. Hofmeyr et al.⁶ concluded that there is not enough evidence to support the use of uterine massage after caesarean or vaginal delivery.

Different strategies have been published to prevent PPH.^{1-6,12} Active management of the third stage of labour consists of a group of interventions, including administration of prophylactic oxytocin at or after the delivery, cord clamping and cutting, controlled cord traction to deliver the placenta, and uterine massage.^{1,2,11,12} These interventions should be evaluated individually for efficacy. Prophylactic oxytocin at any dose has been shown to decrease PPH and the need for therapeutic uterotonics compared with placebo alone.² A Cochrane review has shown that controlled cord traction has the advantage of reducing the risk of manual removal of the placenta and of postpartum blood loss, so that evidence suggests that this intervention can be routinely offered during the third stage of labour in addition to prophylactic oxytocin, provided the birth attendant has the necessary skills.¹ Delayed cord clamping has been associated with neonatal benefits, with no effect on postpartum blood loss. As a simple and inexpensive intervention, uterine massage, in addition to oxytocin and controlled cord traction, by repetitive massaging or squeezing movements, has also been proposed as a possible intervention to reduce the risk of PPH, but the evidence, as shown in this meta-analysis, is more limited and does not seem to show benefit.

The International Confederation of Midwives and the International Federation of Gynecologists and Obstetricians (ICM/FIGO) both recommended routine massage of the uterus after delivery of the placenta in vaginal delivery, as part of the active management of the third stage of labour.¹² Instead, The Society of Obstetricians and Gynaecologists of Canada (SOGC), The Royal College of Obs and the American College of Obstetricians and Gynecologists (ACOG), made no recommendation regarding prophylactic uterine massage in the third stage of labour.

Conclusions

There is limited evidence for efficacy of uterine massage, as part of the active management of the third stage of labour in addition to oxytocin and controlled cord traction, after vaginal delivery for reducing postpartum blood loss. The three trials evaluating this intervention are of low quality, and not all report all outcomes of interest. Therefore, currently, prophylactic oxytocin, delayed cord clamping, and controlled cord traction should be the three standard

interventions for the management of the third stage of labour, with oxytocin and controlled cord traction the two associated with decrease in postpartum blood loss. Despite the FIGO recommendation, there is limited evidence to determine if uterine massage prevents PPH at vaginal delivery, in addition to oxytocin and controlled cord traction. As the three trials evaluating this intervention are of low quality and do not report all outcomes of interest, a further large, multicentre, well-designed RCT should be a research priority.

Contribution to authorship

GS, CC, AC, and VB contributed to the conception, planning, analysis, and writing; HAA and JH contributed to the writing and provided additional unpublished data.

Disclosure of interests

None declared. Completed disclosure of interests form available to view online as supporting information.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Figure S1. Flow diagram of studies identified in the systematic review.

Figure S2. Assessment of risk of bias.

Figure S3. Forest plot for the risk of postpartum haemorrhage.

Table S1. Characteristics of the included trials.

Table S2. Primary and secondary outcomes. ■

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