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Perineal techniques during the second stage of labour for reducing perineal trauma and postpartum complications (Review)

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[Intervention Review]

Perineal techniques during the second stage of labour for reducing perineal trauma and postpartum complications

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ABSTRACT

Rationale

Postpartum haemorrhage (PPH) is responsible for around 27% of global maternal deaths. Perineal tears are common in vaginal births and a significant contributor to excessive blood loss. A diversity of perineal techniques are utilised to prevent perineal trauma and reduce the incidence of PPH; however, they lack evidence-based comparisons to understand their effects.

Objectives

To assess the effect of perineal techniques during the second stage of labour on the incidence of and morbidity associated with perineal trauma to prevent postpartum complications.

Search methods

We searched four databases and two trial registers up to 16 April 2024. We checked references, searched citations and contacted study authors to identify additional studies.

Eligibility criteria

We included randomised controlled trials (RCTs) of women in the second stage of labour who intended to give birth vaginally, comparing any perineal techniques with control or another perineal technique. We excluded studies that performed perineal techniques outside the second stage of labour.

Outcomes

Our critical outcomes were second-, third- and fourth-degree tears measured immediately after birth, and PPH ≥ 500 mL measured within 24 hours after birth.

Risk of bias

We used the Cochrane risk of bias 2 tool to assess bias in the included RCTs.

Synthesis methods

We synthesised results for each outcome within each comparison using meta-analysis where possible. Where this was not possible due to the nature of the data, we synthesised results narratively. We used GRADE to assess the certainty of evidence for each outcome.

Included studies

We included a total of 17 studies with 13,695 participants.

Synthesis of results

Hands off (or poised) versus hands on

Hands off (poised) may result in little to no difference in second-degree tears (risk ratio (RR) 0.73, 95% confidence interval (CI) 0.32 to 1.64; 2 studies; low-certainty evidence) and third- or fourth-degree tears when data are combined (RR 1.27, 95% CI 0.81 to 1.99; 2 studies; low-certainty evidence). The evidence is very uncertain about the effect of hands off (poised) on third-degree tears and fourth-degree tears when reported separately (RR 0.50, 95% CI 0.05 to 5.27; 1 study; very low-certainty evidence and RR 3.00, 95% CI 0.13 to 71.22; 1 study; very low-certainty evidence).

Hands off (poised) may result in little to no difference in PPH ≥ 500 mL (RR 1.16, 95% CI 0.92 to 1.47; 1 study; low-certainty evidence).

Hands off (poised) probably results in little to no difference in breastfeeding two days after birth (RR 1.02, 95% CI 0.99 to 1.06; 1 study; moderate-certainty evidence) and perineal pain (RR 0.98, 95% CI 0.94 to 1.01; 1 study; moderate-certainty evidence).

Vocalisation versus control

Vocalisation may result in a reduction in second-degree tears (RR 0.56, 95% CI 0.23 to 1.38; 1 study; low-certainty evidence) and third-degree tears (RR 0.13, 95% CI 0.01 to 2.32; 1 study; low-certainty evidence), but the CIs are wide and include the possibility of no effect. No events were reported for fourth-degree tears (low-certainty evidence).

Vocalisation may increase maternal satisfaction (RR 1.19, 95% CI 0.93 to 1.51; 1 study; low-certainty evidence).

The evidence is very uncertain about the effect of vocalisation on perineal pain (RR 1.44, 95% CI 0.81 to 2.58; 1 study; very low-certainty evidence).

Warm compress on the perineum versus control (hands off or no warm compress)

Warm compress on the perineum may result in little to no difference in second-degree tears (RR 0.94, 95% CI 0.72 to 1.21; 2 studies; low-certainty evidence), but likely results in a reduction in third- or fourth-degree tears (RR 0.46, 95% CI 0.27 to 0.79; 3 studies; moderate-certainty evidence). Evidence from two smaller studies is very uncertain about the effect of warm compress on the perineum on third-degree tears (RR 0.51, 95% CI 0.04 to 7.05; 2 studies; very low-certainty evidence) or fourth-degree tears (RR 0.11, 95% CI 0.01 to 2.06; 2 studies; very low-certainty evidence) when reported separately.

Warm compress likely results in a large reduction in perineal pain (mean difference (MD) -0.81, 95% CI -1.18 to -0.44; 1 study; moderate-certainty evidence).

The evidence is very uncertain about the effect of warm compress on the perineum on maternal satisfaction and PPH ≥ 500 mL.

Massage of the perineum versus control (hands off or no usual care)

Massage of the perineum may have little to no effect on second-degree tears (RR 1.04, 95% CI 0.89 to 1.21; 4 studies; low-certainty evidence). The evidence is very uncertain about the effect of massage of the perineum on third-degree tears (RR 0.57, 95% CI 0.16 to 2.02; 4 studies; very low-certainty evidence). Massage of the perineum may reduce fourth-degree tears but the CIs are wide and include the possibility of no effect (RR 0.26, 95% CI 0.04 to 1.61; 4 studies; low-certainty evidence). The evidence suggests that massage likely results in little to no difference in perineal pain (RR 0.97, 95% CI 0.90, 1.05; 1 study; moderate-certainty evidence).

One study reported 10 participants with postpartum haemorrhage across three interventions (warm compress, massage, control).

Combined warm compress and massage of the perineum versus control

Combined warm compress and massage of the perineum likely results in a reduction in second-degree tears when compared to a control (RR 0.63, 95% CI 0.46 to 0.86; 1 study; moderate-certainty evidence), but the evidence is very uncertain about the effect on third-degree tears (RR 2.92, 95% CI 0.12 to 70.72; 1 study; very low-certainty evidence).

The intervention may result in a reduction in PPH ≥ 500 mL but the CIs are wide and include the possibility of no effect (RR 0.43, 95% CI 0.14 to 1.35; 1 study; low-certainty evidence).

Combined warm compress and massage likely results in an increase in maternal satisfaction (MD 0.4, 95% CI -0.01 to 0.81; 1 study; moderate-certainty evidence).

Combined warm compress and massage of the perineum versus massage alone

Combined warm compress and massage of the perineum may result in little to no difference in second-degree tears (RR 0.95, 95% CI 0.86 to 1.06; 1 study; low-certainty evidence) when compared to massage alone, but the evidence is very uncertain about the effect on third- or fourth-degree tears (RR 0.98, 95% CI 0.06 to 15.49; 1 study; very low-certainty evidence).

It may also result in little to no difference in PPH ≥ 500 mL (RR 1.10, 95% CI 0.59 to 2.07; 1 study; low-certainty evidence).

The evidence suggests that combined warm compress and massage may result in little to no difference in maternal satisfaction (1 study; low-certainty evidence).

Other perineal techniques

We also assessed evidence on the following comparisons, but since they are used less frequently in global clinical practice to optimise birth outcomes, we have not presented the results summary here: Ritgen's manoeuvre versus standard care; primary delivery of posterior versus anterior shoulder; massage with enriched oil on the perineum versus massage with liquid wax; petroleum jelly on the perineum versus control; and perineal protection device versus control.

Authors' conclusions

Overall, the evidence for the effectiveness of perineal techniques to reduce perineal trauma and postpartum haemorrhage is very uncertain.

Very few studies reported rates of postpartum haemorrhage, adverse events, women's or health workers' experience or other important outcomes that allow us to understand the effectiveness and acceptability of perineal techniques to reduce perineal trauma. Prior to any further large trials, research is needed to clarify the types of interventions, including a clear description of the process of development and involvement of relevant stakeholders. There is a need to clarify how the intervention is proposed to achieve its effects. Trials would benefit from process evaluation alongside, to explore context, mechanisms and effects.

Funding

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Registration

Registration and protocol: PROSPERO, CRD42024537252. Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42024537252.

PLAIN LANGUAGE SUMMARY

What are the benefits and risks of different perineal techniques during the second stage of labour for preventing post-birth injury?

Key messages

- Evidence on the effect of perineal techniques to prevent post-birth injury and blood loss is very uncertain due to poor study quality and small studies.
- Further large, well-conducted studies are needed and should measure post-birth haemorrhage, adverse effects and maternal satisfaction.

What is post-birth injury?

Post-birth injury can occur in the perineal area (the area between the vulva and anus) during active labour. Women with post-birth injury can experience heavy blood loss.

What did we want to find out?

We wanted to find out which perineal technique (for example warm compresses, massage, vocalisation or oils) was better than usual care during active labour to improve perineal injury and blood loss.

We also wanted to find out if different perineal techniques were associated with any unwanted (adverse) effects.

What did we do?

We searched for studies that looked at whether the application of perineal techniques, such as massage, warm compress, vocalisation or oils, in the active phase of labour results in a reduction in perineal injury and blood loss during birth compared to usual care.

We compared and summarised the results of the studies and rated our confidence in the evidence, based on factors such as study methods and the number of women included.

What did we find?

We found 17 studies that included a total of 13,695 women who received a perineal technique or usual care during active labour.

What are the limitations of the evidence?

Half of the studies included were undertaken before 2010 and therefore present older evidence on techniques that may not be frequently used in current clinical practice. Very few studies reported blood loss, women's or health workers' experience of the techniques used, or other important outcomes.

How up-to-date is this evidence?

The evidence is up-to-date to 16 April 2024.

SUMMARY OF FINDINGS

Summary of findings 1. Summary of findings table - Hands off (poised) compared to hands on for pregnant women in the second stage of labour having a spontaneous vaginal birth

Hands off (poised) compared to hands on for pregnant women in the second stage of labour having a spontaneous vaginal birth

Patient or population: pregnant women in the second stage of labour having a spontaneous vaginal birth
Setting: hospital
Intervention: hands off (poised)
Comparison: hands on

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with hands on	Risk with hands off (poised)				
2nd degree tears follow-up: 24 hours	367 per 1000	**268 per 1000** (118 to 602)	**RR 0.73** (0.32 to 1.64)	5541 (2 RCTs)	⊕⊕⊖⊖ Low[a,b]	Hands off (poised) may result in little to no difference in 2nd degree tears.
3rd or 4th degree tears follow-up: 24 hours	12 per 1000	**15 per 1000** (10 to 24)	**RR 1.27** (0.81 to 1.99)	5541 (2 RCTs)	⊕⊕⊖⊖ Low[a,c]	Hands off (poised) may result in little to no difference in 3rd or 4th degree tears.
3rd degree tears follow-up: 24 hours	57 per 1000	**29 per 1000** (3 to 301)	**RR 0.50** (0.05 to 5.27)	70 (1 RCT)	⊕⊖⊖⊖ Very low[a,d]	The evidence is very uncertain about the effect of hands off (poised) on 3rd degree tears.
4th degree tears follow-up: 24 hours	0 per 1000	**0 per 1000** (0 to 0)	**RR 3.00** (0.13 to 71.22)	70 (1 RCT)	⊕⊖⊖⊖ Very low[a,e]	1 event in the hands off group and 0 events in the hands on group. The evidence is very uncertain about the effect of hands off (poised) on 4th degree tears.
PPH ≥ 500 mL follow-up: 24 hours	45 per 1000	**52 per 1000** (41 to 66)	**RR 1.16** (0.92 to 1.47)	5471 (1 RCT)	⊕⊕⊖⊖ Low[a,f]	Hands off (poised) may result in little to no difference in PPH ≥ 500 mL.
Maternal satisfaction - not reported				-	-	No studies reported this outcome.
Breastfeeding follow-up: mean 2 days	673 per 1000	**686 per 1000** (666 to 713)	**RR 1.02** (0.99 to 1.06)	5471 (1 RCT)	⊕⊕⊕⊖ Moderate[a]	Hands off (poised) probably results in little to no difference in breastfeeding.

Postpartum anaemia (Hb < 9 g/dL) - not reported				-	-	No studies reported this outcome.
Perineal pain follow-up: 2 days	713 per 1000	**699 per 1000** (670 to 720)	**RR 0.98** (0.94 to 1.01)	5371 (1 RCT)	⊕⊕⊕⊖ Moderate[a]	Hands off (poised) probably results in little to no difference in perineal pain.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

See interactive version of this table: https://gdt.gradepro.org/presentations/#/isof/isof_question_revman_web_450529021128614075.

[a] Downgraded once for risk of bias as it was judged to be of some concerns.
[b] Downgraded once for imprecision as 95% confidence intervals are wide, ranging between 0.32 and 1.64.
[c] Downgraded once for imprecision as 95% confidence intervals are wide, ranging between 0.81 and 1.99.
[d] Downgraded twice for imprecision as 95% confidence intervals are very wide, ranging between 0.05 and 5.27.
[e] Downgraded twice for imprecision as 95% confidence intervals are extremely wide, ranging between 0.13 and 71.22.
[f] Downgraded once for imprecision as 95% confidence intervals are wide, ranging between 0.92 and 1.47.

Summary of findings 2. Summary of findings table - Vocalisation compared to control for pregnant women in the second stage of labour having a spontaneous vaginal birth

Vocalisation compared to control for pregnant women in the second stage of labour having a spontaneous vaginal birth

Patient or population: pregnant women in the second stage of labour having a spontaneous vaginal birth
Setting: hospital
Intervention: vocalisation
Comparison: control

Outcomes	Anticipated absolute effects* (95% CI)	Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments

	Risk with control	Risk with vocalisation				
2nd degree tears follow-up: 24 hours	471 per 1000	**264 per 1000** (108 to 649)	**RR 0.56** (0.23 to 1.38)	36 (1 RCT)	⊕⊕⊖⊖ Low[a]	Vocalisation may result in a reduction in 2nd degree tears but the confidence intervals are wide and include the possibility of no effect.
3rd degree tears follow-up: 24 hours	176 per 1000	**23 per 1000** (2 to 409)	**RR 0.13** (0.01 to 2.32)	36 (1 RCT)	⊕⊕⊖⊖ Low[b]	Vocalisation may result in a reduction in 3rd degree tears but the confidence intervals are wide and include the possibility of no effect.
4th degree tears follow-up: 24 hours	No events reported for this outcome so we do not know if vocalisation has any effect on 4th degree tears compared with control.			36 (1 RCT)	⊕⊕⊖⊖ Low[c]	No events reported for this outcome. Vocalisation may result in little to no difference in 4th degree tears.
PPH ≥ 500 mL - not reported				-	-	No studies reported this outcome.
Maternal satisfaction	800 per 1000	**952 per 1000** (744 to 1000)	**RR 1.19** (0.93 to 1.51)	40 (1 RCT)	⊕⊕⊖⊖ Low[d,e]	Vocalisation may increase maternal satisfaction.
Breastfeeding at discharge - not reported				-	-	No studies reported this outcome.
Postpartum anaemia (Hb < 9 g/dL) - not reported				-	-	No studies reported this outcome.
Perineal pain	450 per 1000	**648 per 1000** (365 to 1000)	**RR 1.44** (0.81 to 2.58)	40 (1 RCT)	⊕⊖⊖⊖ Very low[d,f]	The evidence is very uncertain about the effect of vocalisation on perineal pain.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

See interactive version of this table: https://gdt.gradepro.org/presentations/#/isof/isof_question_revman_web_450457111620599081.

[a] Downgraded twice for imprecision as data are from one small study (n = 36) and 95% confidence intervals are wide, ranging between 0.23 and 1.38.
[b] Downgraded twice for imprecision as data are from one small study (n = 36) and 95% confidence intervals are very wide, ranging between 0.01 and 2.32.
[c] Downgraded twice for imprecision as only 1 small study with zero events in each group.
[d] Downgraded once for risk of bias because it was judged to be of some concerns as knowledge of the intervention received could effect the self-reported measurement of the outcome by patients.
[e] Downgraded once for imprecision as the data are from one small study.
[f] Downgraded twice for imprecision as the data are from one small study (sample size 40) and 95% confidence intervals are wide, ranging between 0.81 and 2.58.

Summary of findings 3. Summary of findings table - Warm compress on the perineum compared to control (hands off or no warm compress) for pregnant women in the second stage of labour having a spontaneous vaginal birth

Warm compress on the perineum compared to control (hands off or no warm compress) for pregnant women in the second stage of labour having a spontaneous vaginal birth

Patient or population: pregnant women in the second stage of labour having a spontaneous vaginal birth
Setting: hospital
Intervention: warm compress on the perineum
Comparison: control (hands off or no warm compress)

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with control (hands off or no warm compress)	Risk with warm compress on the perineum				
2nd degree tears follow-up: 24 hours	191 per 1000	**180 per 1000** (138 to 232)	**RR 0.94** (0.72 to 1.21)	1006 (2 RCTs)	⊕⊕⊖⊖ Low[a,b]	The evidence suggests that warm compress may result in little to no difference in 2nd degree tears.
3rd or 4th degree tears follow-up: 24 hours	47 per 1000	**22 per 1000** (13 to 37)	**RR 0.46** (0.27 to 0.79)	1723 (3 RCTs)	⊕⊕⊕⊖ Moderate[a]	Warm compress likely results in a reduction in 3rd or 4th degree tears.
3rd degree tears follow-up: 24 hours	9 per 1000	**4 per 1000** (0 to 60)	**RR 0.51** (0.04 to 7.05)	1006 (2 RCTs)	⊕⊖⊖⊖ Very low[a,c]	The evidence is very uncertain about the effect of warm compress on 3rd degree tears.

4th degree tears follow-up: 24 hours	9 per 1000	**1 per 1000** (0 to 18)	**RR 0.11** (0.01 to 2.06)	1006 (2 RCTs)	⊕⊖⊖⊖ Very low[a,d]	The evidence is very uncertain about the effect of warm compress on 4th degree tears.
PPH ≥ 500 mL follow-up: 24 hours	One study reported 10 participants with postpartum heamorrhage across 3 interventions (warm compress, massage, control). Risk ratio could not be calculated as data for each group could not be disaggregated.			808 (1 RCT)	⊕⊖⊖⊖ Very low[a,e]	The evidence is very uncertain about the effect of warm compress on PPH ≥ 500 mL.
Maternal satisfaction	89.1% of women reported increased comfort with the use of warm compress. 56% of women reported that they felt more in control of the second stage of labour due to the warm compress. 1.9% of women reported that they disliked the warm compress 'a lot'. Not measured in the control group so no effect could be estimated.			717 (1 RCT)	⊕⊖⊖⊖ Very low[a,f]	The evidence is very uncertain about the effect of warm compress on the perineum on maternal satisfaction.
Breastfeeding at discharge - not reported				-	-	No studies reported this outcome.
Postpartum anaemia (Hb < 9 g/dL) - not reported				-	-	No studies reported this outcome.
Perineal pain	The mean perineal pain was **4.67**	MD **0.81 lower** (1.18 lower to 0.44 lower)	-	581 (1 RCT)	⊕⊕⊕⊖ Moderate[g]	Warm compress likely results in a reduction in perineal pain.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **MD:** mean difference; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

See interactive version of this table: https://gdt.gradepro.org/presentations/#/isof/isof_question_revman_web_450528783951470573.

[a] Downgraded once for risk of bias as it was judged to be of some concerns due to lack of pre-specified analysis plans and unblinded assessment of the outcome.
[b] Downgraded once for imprecision as 95% confidence intervals are wide, ranging between 0.72 and 1.21.
[c] Downgraded twice for imprecision as results vary considerably between studies, with some demonstrating a protective effect of warm compress and others demonstrating a negative effect and 95% confidence intervals are extremely wide, ranging between 0.04 and 7.05.
[d] Downgraded twice for imprecision as 95% confidence intervals are very wide, ranging between 0.01 and 2.06.
[e] Downgraded twice for imprecision as data could not be disaggregated between groups but a small number of events suggests no effect.
[f] Downgraded twice for imprecision as the study did not disaggregate data for each study arm, which prevents comparison of the result in those that received the intervention and those that received the control.
[g] Downgraded once for risk of bias as it was judged to be of some concerns due to lack of pre-specified analysis plan and subjective outcome assessment.

Summary of findings 4. Summary of findings table - Massage of the perineum compared to control (hands off or usual care) for pregnant women in the second stage of labour having a spontaneous vaginal birth

Massage of the perineum compared to control (hands off or usual care) for pregnant women in the second stage of labour having a spontaneous vaginal birth

Patient or population: pregnant women in the second stage of labour having a spontaneous vaginal birth
Setting: hospital
Intervention: massage of the perineum
Comparison: control (hands off or usual care)

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with control (hands off or usual care)	Risk with massage of the perineum				
2nd degree tears follow-up: 24 hours	211 per 1000	**219 per 1000** (187 to 255)	**RR 1.04** (0.89 to 1.21)	2401 (4 RCTs)	⊕⊕⊖⊖ Low	Massage of the perineum may have little to no effect on 2nd degree tears.
3rd degree tears follow-up: 24 hours	26 per 1000	**15 per 1000** (4 to 52)	**RR 0.57** (0.16 to 2.02)	2401 (4 RCTs)	⊕⊖⊖⊖ Very low[a,b,c]	The evidence is very uncertain about the effect of massage of the perineum on 3rd degree tears.
4th degree tears follow-up: 24 hours	4 per 1000	**1 per 1000** (0 to 7)	**RR 0.26** (0.04 to 1.61)	2401 (4 RCTs)	⊕⊕⊖⊖ Low[d,e]	Massage of the perineum may reduce 4th degree tears but the confidence intervals are wide and include the possibility of no effect.
PPH ≥ 500 mL follow-up: 24 hours	One study reported 10 participants with postpartum heamorrhage across 3 interventions (warm compress, massage, control). Risk ratio could not be calculat-			807 (1 RCT)	⊕⊕⊖⊖ Low[f]	Massage of the perineum may result in little to no difference in PPH ≥ 500 mL.

	ed as data for each group could not be disaggregated.					
Maternal satisfaction - not reported				-	-	No studies reported this outcome.
Breastfeeding at discharge - not reported				-	-	No studies reported this outcome.
Postpartum anaemia (Hb < 9 g/dL) - not reported				-	-	No studies reported this outcome.
Perineal pain follow-up: 3 days	0 per 1000	**0 per 1000** (0 to 0)	**RR 0.97** (0.90 to 1.05)	1340 (1 RCT)	⊕⊕⊕⊖ Moderate[d]	Massage of the perineum likely results in little to no difference in perineal pain.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

See interactive version of this table: https://gdt.gradepro.org/presentations/#/isof/isof_question_revman_web_450528492981063102.

[a] Downgraded twice for risk of bias as it was judged to be of some concerns for three studies, and high risk of bias for one study (Attarha 2009).
[b] Downgraded once for inconsistency as results varied between studies. Some studies reported beneficial effects of massage on third degree tears but others reported negative effects.
[c] Downgraded once for imprecision as confidence intervals are wide, ranging between 0.16 to 2.02.
[d] Downgraded once for risk of bias as it was judged to be of some concerns.
[e] Downgraded once for imprecision as confidence intervals are wide, ranging between 0.04 to 1.61.
[f] Downgraded twice for imprecision as one study reported 10 participants with postpartum heamorrhage across three interventions (warm compress, massage, control). Risk ratio could not be calculated as data for each group could not be disaggregated.

Summary of findings 5. Summary of findings table - Combined warm compress and massage of the perineum compared to control for pregnant women in the second stage of labour having a spontaneous vaginal birth

Combined warm compress and massage of the perineum compared to control for pregnant women in the second stage of labour having a spontaneous vaginal birth

Patient or population: pregnant women in the second stage of labour having a spontaneous vaginal birth
Setting: hospital
Intervention: combined warm compress and massage of the perineum
Comparison: control

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with control	Risk with combined warm compress and massage of the perineum				
2nd degree tears follow-up: 24 hours	662 per 1000	**417 per 1000** (305 to 570)	**RR 0.63** (0.46 to 0.86)	156 (1 RCT)	⊕⊕⊕⊖ Moderate[a]	Combined warm compress and massage likely results in a reduction in 2nd degree tears.
3rd degree tears follow-up: 24 hours	0 per 1000	**0 per 1000** (0 to 0)	**RR 2.92** (0.12 to 70.72)	156 (1 RCT)	⊕⊖⊖⊖ Very low[b,c]	1 event in the combined warm compress and massage group and 0 events in the control group. The evidence is very uncertain about the effect of combined warm compress and massage on 3rd degree tears.
4th degree tears - not reported				-	-	No studies reported this outcome.
PPH ≥ 500 mL follow-up: 24 hours	117 per 1000	**50 per 1000** (16 to 158)	**RR 0.43** (0.14 to 1.35)	156 (1 RCT)	⊕⊕⊖⊖ Low[b,d]	Combined warm compress and massage may result in a reduction in PPH ≥ 500 mL but the confidence intervals are wide and include the possibility of no effect.
Maternal satisfaction	The mean maternal satisfaction was **7.9**	MD **0.4 higher** (0.01 lower to 0.81 higher)	-	119 (1 RCT)	⊕⊕⊕⊖ Moderate[e]	Combined warm compress and massage likely results in an increase in maternal satisfaction.
Breastfeeding at discharge - not reported				-	-	No studies reported this outcome.

Postpartum anaemia (Hb < 9 g/dL) - not reported			-	-	No studies reported this outcome.
Perineal pain - not reported			-	-	No studies reported this outcome.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: confidence interval; **MD:** mean difference; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

See interactive version of this table: https://gdt.gradepro.org/presentations/#/isof/isof_question_revman_web_450459385536301777.

[a] Downgraded once for risk of bias as it was judged to be of some concerns as second degree tear was not specified as an outcome in the trial registry.
[b] Downgraded once for risk of bias as it was judged to be of some concerns due to details on measurement of the outcome not being specified.
[c] Downgraded twice for imprecision as 95% confidence intervals are very wide, ranging between 0.12 and 70.72. The result is based on one event in one study.
[d] Downgraded once for imprecision as 95% confidence intervals are wide, ranging between 0.14 and 1.35.
[e] Downgraded once for risk of bias because it was judged to be of some concerns as knowledge of the intervention received could affect the self-reported measurement of the outcome by patients.

Summary of findings 6. Summary of findings table - Combined warm compress and massage of the perineum compared to massage for pregnant women in the second stage of labour having a spontaneous vaginal birth

Combined warm compress and massage of the perineum compared to massage for pregnant women in the second stage of labour having a spontaneous vaginal birth

Patient or population: pregnant women in the second stage of labour having a spontaneous vaginal birth
Setting: hospital
Intervention: combined warm compress and massage of the perineum
Comparison: massage

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with massage	Risk with combined warm compress and				

		massage of the perineum				
2nd degree tears follow-up: 24 hours	861 per 1000	**818 per 1000** (741 to 913)	**RR 0.95** (0.86 to 1.06)	277 (1 RCT)	⊕⊕⊖⊖ Low[a,b]	Combined warm compress and massage- may result in little to no difference in 2nd degree tears.
3rd or 4th degree tears follow-up: 24 hours	7 per 1000	**7 per 1000** (0 to 113)	**RR 0.98** (0.06 to 15.49)	277 (1 RCT)	⊕⊖⊖⊖ Very low[a,c]	The evidence is very uncertain about the effect of combined warm compress and massageon 3rd or 4th degree tears.
PPH ≥ 500 mL follow-up: 24 hours	117 per 1000	**128 per 1000** (69 to 242)	**RR 1.10** (0.59 to 2.07)	277 (1 RCT)	⊕⊕⊖⊖ Low[a,d]	Combined warm compress and massage may result in little to no difference in PPH ≥ 500 mL.
Maternal satisfaction	Maternal satisfaction with intervention was measured using an 11-point visual numerical score of 0 (completely dissatisfied) to 10 (completely satisfied). The median (interquartile range) was 7 (6 to 8) in the massage and warm compress group and 6 (5 to 8) in the massage only group.			277 (1 RCT)	⊕⊕⊖⊖ Low[a,b]	The evidence suggests that combined warm compress and massage may result in little to no difference in maternal satisfaction.
Breastfeeding at discharge - not reported				-	-	No studies reported this outcome.
Postpartum anaemia (Hb < 9 g/dL) - not reported				-	-	No studies reported this outcome.
Perineal pain - not reported				-	-	No studies reported this outcome.

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: confidence interval; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

See interactive version of this table: https://gdt.gradepro.org/presentations/#/isof/isof_question_revman_web_450456686974055523.

[a] Downgraded once for risk of bias as it was judged to be of some concerns for measurement of the outcome.
[b] Downgraded once for imprecision as data are from one study of 277 participants.
[c] Downgraded twice for imprecision as 95% confidence intervals are extremely imprecise, ranging from 0.06 to 15.49.
[d] Downgraded once for imprecision as 95% confidence intervals are wide, ranging from 0.59 to 2.07.

BACKGROUND

Description of the condition

Postpartum haemorrhage (PPH) is commonly defined as a blood loss of 500 mL or more within 24 hours after birth. About 27% of global maternal deaths are attributable to PPH, making PPH the leading cause of maternal mortality worldwide [1]. While PPH is relatively common — affecting approximately 5% of all births worldwide — most PPH-related deaths (around 80%) occur in low- and middle-income countries (LMICs), primarily in sub-Saharan Africa and South Asia [2, 3]. Most of these deaths could be avoided by using prophylactic uterotonics during the third stage of labour, paired with timely detection and appropriate treatment. Reducing the burden of PPH has important health and equity implications towards achieving the Sustainable Development Goal (SDG) targets [4].

Effectively intervening against PPH requires understanding and addressing a range of interrelated clinical and non-clinical contributing factors. Risk factors include maternal anaemia, grand-multiparity, prolonged labour and multiple gestation [5]. However, many women presenting with PPH have no identifiable risk factors. Thus, health workers must be prepared to quickly detect and manage excessive bleeding in all births. Uterine atony is the most common cause of PPH; other causes include vaginal and cervical trauma (lacerations or tears), uterine rupture, retained placental tissue and maternal bleeding disorders. Multiple causes of PPH can co-exist in the same woman, which means healthcare workers must be prepared to detect and treat PPH from all causes in all women giving birth. Appropriate treatment of PPH relies on a combination of medications and clinical interventions, with the ability to rapidly escalate to higher levels of care if the bleeding is unresponsive to initial treatment.

Description of the intervention and how it might work

Perineal tears are common in vaginal births and are a significant contributor to a range of adverse short- and long-term outcomes, including excessive blood loss [6]. In recognition, increasing attention has been directed to potential preventative strategies that can be used during the second stage of labour to prevent or minimise trauma. Techniques in interventions implemented during the second stage of labour and evaluated in research include perineal management such as ‘hands off/hands poised’ and Ritgen’s manoeuvre, perineal massage and application of warm compresses [7, 8, 9].

Across many settings, traditional practice dictated that birth attendants applied downward pressure on the foetal occiput during birth, whilst the other hand was placed on the perineum. ‘Hands on’ was believed to reduce trauma by controlling the speed of expulsion, reducing the diameter of the presenting part by flexion and supporting perineal structures. Similarly, Ritgen's manoeuvre, where upwards pressure is applied on the foetal chin through the perineum, between the coccyx and the anus with one hand, whilst supporting the occiput to maintain flexion with the other, has been advocated for controlled birth of the head [10]. The ‘modified’ technique is performed during uterine contractions rather than between, as originally described [11]. Birth attendants also often encourage women to ‘breathe’ rather than push as the head is birthed and assist with downward traction to release the anterior shoulder, followed by guiding the body upward to birth the posterior shoulder [12]. However, accumulating evidence has indicated a lack of benefit from perineal management techniques compared to ‘hands off’ in reducing perineal trauma, including severe trauma and other potential disadvantages in associated outcomes and experiences [13, 14].

Perineal massage, with or without lubricants (including oils, gels and creams) usually involves the birth attendant inserting the middle and index fingers into the vagina and gently stretching the perineal tissue during the second stage [15, 16]. This may increase the flexibility of the tissues. Application of warm and cold compresses to the perineum, usually using a cloth pad or pack [17, 18], has also been practised. Heat and cold application are thought to influence perineal tissue hydration and blood flow.

This systematic review is an update of a review published in 2017 [13]. A new protocol was required to reflect the development of a core outcome set for postpartum haemorrhage [19], to inform World Health Organization (WHO) guidelines, and to include the revised risk of bias 2 tool [20] and Cochrane's trustworthiness tool [21].

Why it is important to do this review

Despite the existence of recommended interventions for preventing, detecting and treating PPH, effective implementation of evidence-based interventions has lagged. Potentially lifesaving interventions may be used inconsistently or deployed late due to delayed detection of PPH. Current normative guidance is fragmented and, at times, contradictory across guideline developers, contributing to confusion in the field. Broader health system challenges, such as weak supply chains, human resource constraints and limited blood transfusion capacity, hinder efforts to reduce PPH-related mortality and morbidity. Strong normative efforts that address these challenges have great potential to improve the global response to PPH.

Therefore, it is of priority to prevent PPH and one way to do this may be through perineal techniques during the second stage of labour to try to reduce perineal trauma. It has been suggested that both the flexion technique and Ritgen's manoeuvre act against the normal mechanism of labour in which the baby naturally angles itself in the most appropriate attitude to pass through the birth canal [22]. This poses the question of which perineal techniques are beneficial for preventing perineal trauma.

This is a new Cochrane review with outcomes relevant to postpartum complications. It is based on a previous Cochrane review, last updated in 2017 [13].

OBJECTIVES

To assess the effect of perineal techniques during the second stage of labour on the incidence of and morbidity associated with perineal trauma to prevent postpartum complications.

METHODS

We followed the Methodological Expectations for Cochrane Intervention Reviews when conducting the review and the Preferred Reporting Items of Systematic reviews and Meta-Analyses [23] for the reporting.

The search was not re-run prior to final analyses due to the short time frame between the original search (April 2024) and submission for editorial approval (June 2024). We assessed all critical and important outcomes for risk of bias and assessed the certainty of evidence for all outcomes. Through discussions with WHO, it was decided to add maternal satisfaction to the summary of findings tables as a patient-important outcome. Comments from Cochrane led us to prioritise the comparisons included in the summary of findings tables through discussions with clinical experts and WHO.

Criteria for considering studies for this review

Types of studies

We included all randomised controlled trials (RCTs) or cluster-RCTs comparing the effectiveness and side effects of different perineal techniques during the second stage of labour to reduce perineal trauma and related postpartum complications. We excluded quasi-randomised trials (for example, studies randomised by days of the week or date of birth). Randomised trials published only as abstracts were eligible where we could retrieve sufficient information.

Types of participants

We included studies of pregnant women in the second stage of labour having a spontaneous vaginal birth in hospital or community settings (after 36 weeks of pregnancy, pregnant with a single fetus, cephalic presentation).

If a subset of the participants included in a trial report were eligible, then we contacted authors to try to obtain data for the subset of participants.

Types of interventions

Intervention

Trials were eligible if they administered any perineal techniques, for example: perineal massage, flexion technique, Ritgen's manoeuvre, warm compresses, hands on or hands poised, all performed during the second stage of labour to reduce perineal trauma for preventing postpartum haemorrhage (PPH) and compared them to care as usual or any other perineal technique.

We excluded studies investigating perineal techniques that were not administered in the second stage of labour. We also excluded studies that investigated the effect of one versus two midwives present or the effect of different positions for birth (including those that used devices to support different positions), as these were not considered perineal techniques.

Comparator(s)/control

Care as usual or any other perineal technique.

Regarding perineal management in the second stage of labour, usual care varies considerably across settings and birth attendants. Techniques employed include hands on and hands off, perineal massage with various topical agents, application of warm or cold compresses and vocalisation. For this review we accepted the definition of usual care provided by the author.

Outcome measures

To develop the list of priority outcomes, we evaluated the PPH core outcome set and lists of critical and important outcomes from previous WHO PPH guidelines [19].

Critical outcomes

- Second-degree tears
- Third-degree tears
- Fourth-degree tears
- PPH ≥ 500 mL

Important outcomes

- PPH ≥ 1000 mL
- Additional uterotonics
- Blood transfusion
- Maternal death
- Severe morbidity (defined as maternal deaths or severe morbidity events adapted from WHO “near miss” criteria [24], to include major surgery (laparotomy, uterine artery ligation, internal iliac artery ligation, B-Lynch suture, hysterectomy, extensive vaginal repair), admission to the intensive care unit or vital organ failure (temporary or permanent))
- Side effects (variable and related to the intervention)
- Maternal satisfaction (as measured within the trial reports, validated measures are preferred)
- Maternal wellbeing (measured using general health questionnaires)
- Breastfeeding at discharge
- Postpartum anaemia (Hb < 9 g/dL)
- Perineal pain (as measured within the trial reports, validated measures are preferred)

The time points for PPH are usually in the first 24 hours after birth. For other outcomes, this would be at any point during the postpartum period.

If multiple tools were used to measure an outcome, we used validated tools.

Search methods for identification of studies

We tried to identify all relevant trials, regardless of language or publication status. We cross-referenced this list with studies included in a previous Cochrane review [13], to guarantee that we included all relevant studies from that review in this one.

Electronic searches

We searched the following databases, using the search terms and strategy described in Supplementary material 1. We used the Cochrane sensitivity-maximising RCT filter for MEDLINE Ovid and its adaptations to the other databases, except CENTRAL [25].

- Central Register of Controlled Trials (CENTRAL; 2024, Issue 3), in the Cochrane Library (searched 16 April 2024);
- MEDLINE Ovid (1946 to 13 April 2024);
- Embase Ovid (1947 to 16 April 2024);
- CINAHL (EbscoHost; 1982 to 16 April 2024)

In addition, on 16 April 2024 we searched ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform (ICTRP) for unpublished, planned and ongoing trial reports.

We also handsearched the references of systematic reviews and meta-analyses of eligible studies published in the last five years.

If papers were not accessible, we contacted the relevant authors and organisations.

Searching other resources

We retrieved additional relevant references cited in papers identified through the above search strategy and searched for the full texts of trials initially identified as abstracts. For randomised trials published only as abstracts, we sought information from primary authors to investigate whether these studies met our eligibility criteria before including them. We did not apply any language or date restrictions.

Data collection and analysis

Selection of studies

At least two review authors (KD, TF or VL) independently assessed the title, abstract and full text of all potential studies identified for inclusion using Covidence [26]. We resolved disagreements through discussion or, when required, in consultation with a third review author (TAM or TL).

Data extraction and management

We used Covidence to extract data [26]. For eligible studies, at least two review authors (KD, TF or VL) independently extracted the data using a blank electronic form. We resolved discrepancies through discussion or, if required, consultation with another review author. We entered data into the Review Manager software [27] and checked for accuracy. When information was unclear, we attempted to contact the authors of the original reports to provide further details.

We extracted the following information.

Outcome data

From each included study we extracted at least:

- the number of participants;
- any exclusion criteria;
- the interventions being compared and their respective critical and important outcomes;
- all relevant arm-level data (e.g. number of events and number of patients for binary outcomes and means and standard deviations per study arm for continuous outcomes).

Data on potential effect modifiers

From each included study we extracted the following study, intervention and population characteristics that may act as effect modifiers:

- nulliparous versus parous.

Other data

From each included study we extracted the following additional information:

- country or countries in which the study was performed;
- date of publication and dates of recruitment;
- type of publication (full-text publication, abstract publication, unpublished data);
- trial registration reference.

Risk of bias assessment in included studies

The assessment of the quality of individual studies included in systematic reviews of intervention studies follows specific and explicit methods of risk of bias assessment.

Two review authors (KD, TF) independently assessed the risk of bias of randomised trials using the Excel tool for the revised Cochrane risk of bias tool: RoB 2 [20]. We resolved any disagreement by discussion or by involving a third review author.

For each included trial and each critical and important outcome, we assessed the following domains of bias:

- (1a) Bias arising from the randomisation process
- (1b) (For cluster trials only) Bias arising from identification or recruitment of individual participants within clusters
- (2) Bias due to deviations from intended interventions
- (3) Bias due to missing outcome data
- (4) Bias in measurement of the outcome
- (5) Bias in selection of the reported result
- (6) Overall bias

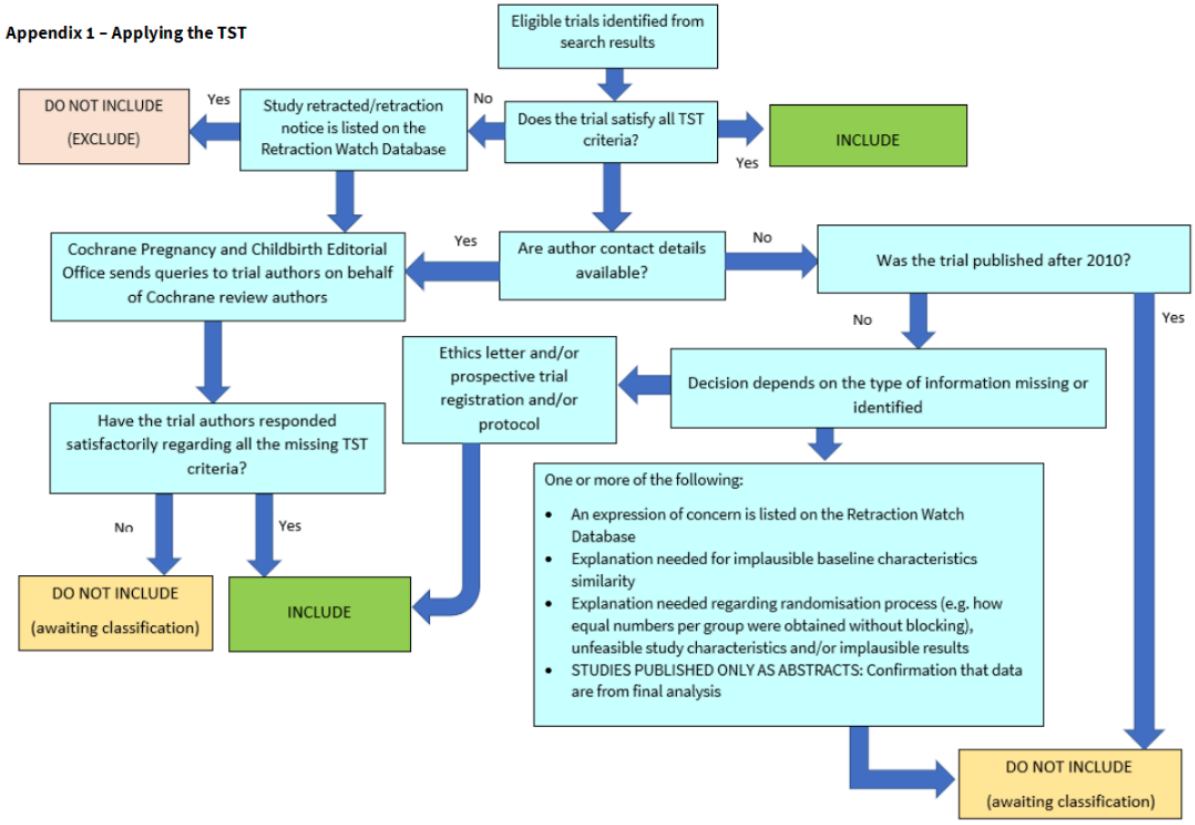
For domains (3) to (5), we assessed the risk of bias separately for each outcome.

- Second-degree tears
- Third-degree tears
- Fourth-degree tears
- PPH ≥ 500 mL
- Breastfeeding at discharge
- Postpartum anaemia (Hb < 9 g/dL)
- Perineal pain

For each domain of bias above, we provided an explicit assessment of whether the study was at low risk, some concerns or high risk of bias. During assessment, we recorded any subjective judgements, important concerns about the methods, potential sources of bias and reasons for deviating from the assessment results generated by the algorithms. We also assessed the likely magnitude and direction of the bias and whether it was considered likely to impact on the findings. For the final assessment of the overall risk of bias, we made explicit judgements about whether studies were at high risk of bias, according to the criteria in the current *Cochrane Handbook for Systematic Reviews of Interventions* [28].

In addition, we used a research integrity assessment tool to establish the integrity and authenticity of studies: the Cochrane Trustworthiness Screening Tool, developed by Cochrane Pregnancy and Childbirth [21]. See Figure 1.

Figure 1. Cochrane Pregnancy and Childbirth Trustworthiness Screening Tool (TST) [21].



Screening eligible studies for scientific integrity/trustworthiness

Two review authors (KD, TF) evaluated all studies that met our inclusion criteria against predefined criteria to select studies which, based on available information, were deemed to be sufficiently trustworthy to be included in the analysis.

Where a study was classified as being at 'high risk' for one or more of the below criteria, we attempted to contact the study authors to address any possible lack of information and concerns. If adequate information remained unavailable, the study was categorised as 'awaiting classification', and we described the concerns and communications with the author (or lack thereof) in detail. The process is described fully in Figure 1.

The criteria are as follows.

Research governance

1. No prospective trial registration for studies published after 2010 without plausible explanation
2. When requested, trial authors refuse to provide/share the protocol or ethics approval letter (or both)
3. Trial authors refuse to engage in communication with the Cochrane review authors
4. Trial authors refuse to provide trial data upon request with no justifiable reason

Baseline characteristics

1. Characteristics of the study participants are too similar (distribution of mean (standard deviation (SD)) excessively narrow or excessively wide)

Feasibility

1. Implausible numbers (e.g. 500 women with severe cholestasis of pregnancy recruited in 12 months)
2. (Close to) zero losses to follow-up without plausible explanation

Results

1. Implausible results (e.g. massive risk reduction for main outcomes with small sample size)
2. Unexpectedly even numbers of women 'randomised', including a mismatch between the numbers and the methods, e.g. if it is stated that no blocking was used, but there are still equal numbers, or it is stated that blocks of four were used, but the final numbers differ by six

Measures of treatment effect

Dichotomous data

For dichotomous data, we present results as a summary risk ratio (RR) with 95% confidence interval (CI).

Continuous data

For continuous data, we use the mean difference (MD) if outcomes are measured in the same way between trials.

Unit of analysis issues

Cluster-randomised trials

We planned to include cluster-randomised trials in the analyses along with individually randomised trials, but none were identified. If cluster trials are identified in future versions of this review, we will adjust their sample sizes using the methods described in the *Cochrane Handbook for Systematic Reviews of Interventions* [29], using an estimate of the intracluster correlation coefficient (ICC) derived from the trial (if possible), from a similar trial or from a study of a similar population. If we use ICCs from other sources, we will report this and conduct sensitivity analyses to investigate the effect of variation in the ICC.

We considered it reasonable to combine the results from both cluster-randomised trials and individually randomised trials if there was little heterogeneity between the study designs, and we considered the interaction between the effect of intervention and the choice of randomisation unit to be unlikely. We acknowledged heterogeneity in the randomisation unit and performed a sensitivity analysis to investigate the effects of the randomisation unit.

Dealing with missing data

For all outcomes, we carried out analyses on an intention-to-treat basis as far as possible, i.e. we attempted to include all participants randomised to each group in the analyses, and all participants were analysed in the group to which they were allocated, regardless of whether or not they received the allocated intervention. The denominator for each outcome in each trial was the number randomised minus any participants whose outcomes are known to be missing.

Reporting bias assessment

If there were 10 or more studies in the meta-analysis, we planned to investigate reporting biases (such as publication bias) using funnel plots. We planned to assess funnel plot asymmetry visually, and use formal tests for funnel plot asymmetry. For continuous outcomes, we planned to use the test proposed by Egger [30], and for dichotomous outcomes the test proposed by Harbord [31]. If asymmetry had been detected in any of these tests or was suggested by a visual assessment, we would have performed exploratory analyses to investigate it.

Synthesis methods

We performed standard pairwise meta-analyses using a random-effects model for every comparison with at least two trials, using Review Manager software [27]. The random-effects method is preferred as it incorporates an assumption that the different studies are estimating different, yet related, intervention effects [32]. The standard errors of the study-specific estimates are adjusted to incorporate a measure of the extent of heterogeneity. This results in wider CIs in the presence of heterogeneity, and corresponding claims of statistical significance are more conservative.

Investigation of heterogeneity and subgroup analysis

We assessed statistical heterogeneity in each meta-analysis by visually assessing the forest plot and using the T^2, I^2 and Chi^2 statistics. We regarded heterogeneity as substantial if I^2 was greater than 30% and either T^2 was greater than zero, or there was a low P value (less than 0.10) in the Chi^2 test for heterogeneity.

We considered whether an overall summary was meaningful and if we identified substantial heterogeneity, we planned to investigate it using subgroup analyses and sensitivity analyses. However, too few studies were included in the meta-analyses to be able to undertake subgroup analyses.

We planned to carry out the following subgroup analyses:

- Nulliparous versus parous

The following outcomes would have been used in the subgroup analyses:

- Second-degree tears
- Third-degree tears
- Fourth-degree tears
- PPH ≥ 500 mL
- Breastfeeding at discharge
- Postpartum anaemia (Hb < 9 g/dL)
- Perineal pain

We planned to assess differences between subgroups by inspection of the subgroups' CIs; non-overlapping CIs indicate a statistically significant difference in treatment effect between the subgroups.

Equity-related assessment

Though the incidence of postpartum haemorrhage is similar around the world, maternal mortality and severe morbidity due to PPH are concentrated in low-resource settings and disproportionately affect women who are socially disadvantaged. Recognising that context may influence the implementation of an intervention, we extracted data on the country or countries in which trials were conducted (as a proxy for resource-level) and considered how contextual factors may influence the transferability and applicability of results in the interpretation of the evidence. This was planned as a subgroup analysis, but due to too few studies included in the individual comparisons, we could not conduct any subgroup analyses.

In addition, a separate Cochrane systematic review has been conducted on the perceptions and experiences of women, communities and health workers with respect to postpartum haemorrhage prevention, diagnosis and treatment [33].

Sensitivity analysis

We conducted sensitivity analyses to explore the effect of risk of bias for each comparison by restricting analysis to those trials rated as 'low risk of bias' for overall risk of bias. If any cluster-randomised trials are identified in future versions of this review, we will also conduct a sensitivity analysis comparing individually randomised trials to cluster-randomised trials and different ICC values. For each comparison, we limited analyses to the following outcomes:

- Second-degree tears

- Third-degree tears
- Fourth-degree tears
- PPH ≥ 500 mL
- Breastfeeding at discharge
- Postpartum anaemia (Hb < 9 g/dL)
- Perineal pain

Certainty of the evidence assessment

We assessed the certainty of the overall evidence using the GRADE approach, as outlined in the *GRADE Handbook*, to assess the certainty of the body of evidence relating to the following outcomes [34]:

- Second-degree tears at birth
- Third-degree tears at birth
- Fourth-degree tears at birth
- PPH ≥ 500 mL in the first 24 hours after birth
- Breastfeeding at discharge
- Postpartum anaemia (Hb < 9 g/dL)
- Perineal pain
- Satisfaction

We assessed evidence for all available comparisons; however, in the main summary of findings tables, we have presented the certainty of the evidence rating for the comparison of hands on versus hands off, vocalisation versus control, warm compress on the perineum compared to control, massage of the perineum compared to control, combined warm compress and massage of the perineum compared to control, combined warm compress and massage of the perineum compared to massage for reducing perineal trauma and postpartum complications. These perineal techniques are the most frequently used in clinical practice globally to optimise birth outcomes, including minimising perineal trauma and blood loss. The certainty of the evidence ratings for all other comparisons are reported in OSF | Perineal techniques during the second stage of labour for reducing perineal trauma and postpartum complications: A Systematic Review Protocol.

We imported data from RevMan to the GRADEpro Guideline Development Tool [35], to create summary of findings tables. We produced a summary of the intervention effect and a measure of certainty for each of the outcomes below using the GRADE approach. The GRADE approach uses five considerations (study limitations, consistency of effect, imprecision, indirectness and publication bias) to assess the certainty of the body of evidence for each outcome. The evidence can be downgraded from 'high certainty' by one level for serious (or by two levels for very serious) limitations.

Two review authors (KD, TF) independently appraised the certainty ratings. We resolved disagreements between review authors through discussion and consultation with a third review author where necessary. The certainty of evidence for each outcome was rated as 'high', 'moderate', 'low' or 'very low', in accordance with the GRADE approach as explained below.

- High certainty: we are very confident that the true effect lies close to that of the effect estimate.
- Moderate certainty: we are moderately confident in the effect estimate. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
- Low certainty: our confidence in the effect estimate is limited. The true effect may be substantially different from the estimate of the effect.
- Very low certainty: we have very little confidence in the effect estimate. The true effect is likely to be substantially different from the estimate of effect.

Consumer involvement

We did not involve consumers in this review due to limited time and resources. However, we used core outcome sets for the review's outcomes, which were developed with consumer involvement [19].

RESULTS

Description of studies

Results of the search

The search identified 2501 results, and automation tools in Covidence automatically excluded 456 records. One review author (KD) checked these records. We received one additional record through expert communication that was published after our search date. After removing duplicates, we assessed 1123 records at title and abstract screening and deemed 1016 records to be irrelevant. We performed full-text assessment on 107 records.

We excluded 45 records and listed 9 records as ongoing. After application of the trustworthiness tool and subsequent responses from study authors that were contacted for further information, we placed 24 studies (28 articles) in the awaiting assessment section. We included 17 studies (25 articles) in the quantitative analysis in the review (Figure 2; Aabakke 2016 [36, 37]; Albers 2005 [38, 39, 40]; André 2024 [41]; Araujo 2008 [42]; Attarha 2009 [43]; Califano 2022 [44]; Dahlen 2007 [45, 46]; Geranmayeh 2012 [47]; Goh 2021 [48]; Harlev 2013 [49, 50]; Hong 2022 [51]; Jönsson 2008 [52]; Lavesson 2014 [53]; McCandlish 1998 [54, 55, 56]; Neta 2022 [57]; Stamp 2001 [58]; Terre-Rull 2014 [59, 60]).

Figure 2. PRISMA flow diagram [23]

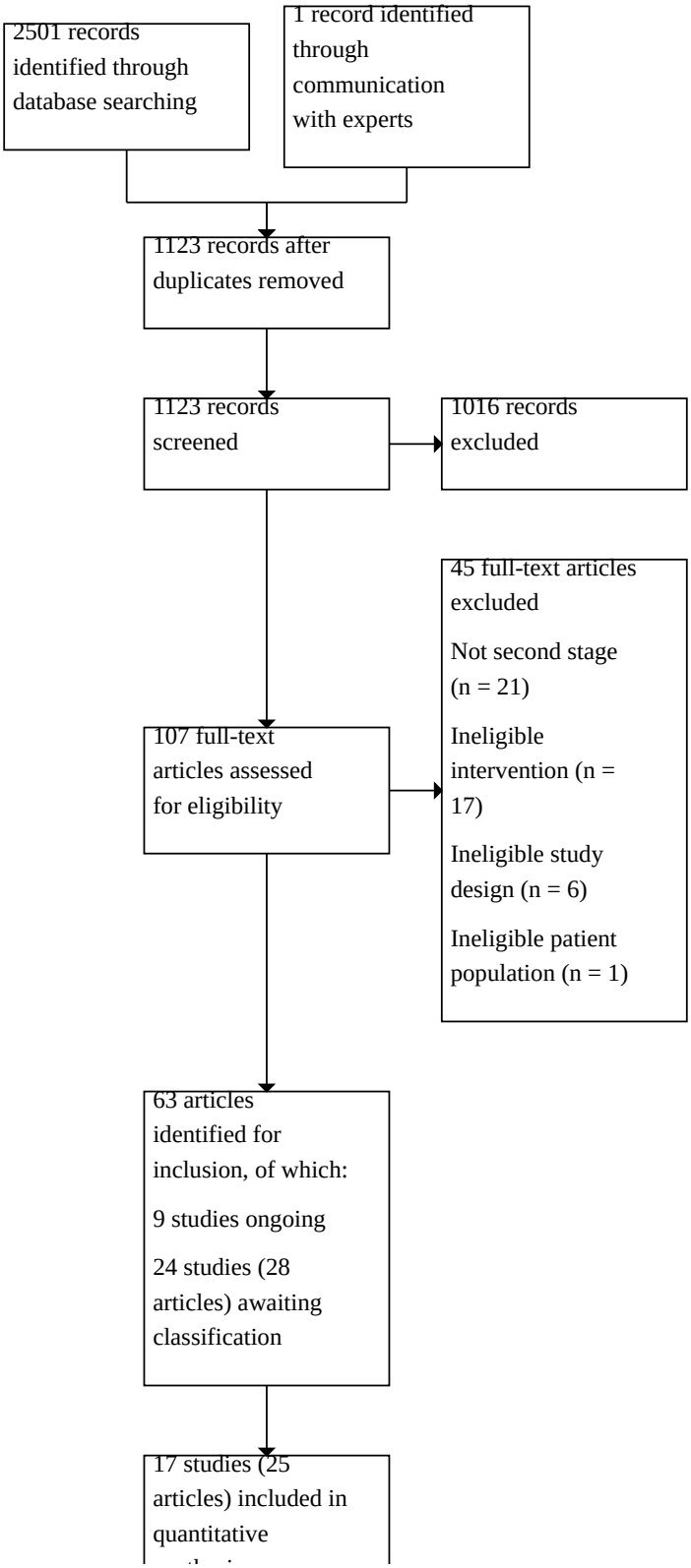


Figure 2. (Continued)

quantitative synthesis (meta-analysis)

Included studies

The characteristics of the included studies are outlined in Table 1 and Supplementary material 2.

Trial design and location

All included studies were randomised controlled trials (RCTs). Studies were conducted in Italy [44], the UK [54], the USA [38], Spain [60], Australia [45, 58], Iran [43, 47], Malaysia [48, 51], Sweden [41, 52, 53], Denmark [36], Israel [49] and Brazil [42, 57].

The study by Albers investigated two interventional comparisons: warm compress versus control, and perineal massage versus control [38]. All other studies investigated one interventional comparison.

Interventions

Hands off (or poised) versus hands on

Two studies investigated the effect of hands off versus hands on techniques [44, 54]. For both studies, this involved no touching of the head or perineum during the second stage of labour in the hands off (or poised) group, and one hand on the fetal head and one hand on (or guarding) the perineum in the hands on group.

Warm compress versus control (hands off or no warm compress)

Three studies investigated the effect of the use of a warm compress on the perineum versus control [38, 45, 60]. For Albers, this involved a continuous warm compress held to the perineum and external genitalia between pushes, versus no touching of the perineum in the control group [38]. For Terre-Rull, with three arms, individuals in the intervention groups received a warm compress on the perineum that was either moist or dry [60]. In the control group, no heat was used. In Dahlen 2007, a warm pack soaked in warm water was placed on the perineum during contractions, and usual care was applied in the control group [45].

Perineal massage versus control (hands off or no usual care)

Four studies investigated the effect of massage versus control [38, 43, 47, 58].

Ritgen's manoeuvre versus standard care

One study investigated the effect of the use of Ritgen's manoeuvre, which involves lifting the fetal chin interiorly and extending the fetal neck, versus standard care with one hand on the perineum [52].

Primary delivery of posterior versus anterior shoulder

One study investigated the effect of the primary delivery of the posterior shoulder versus the primary delivery of the anterior shoulder [36].

Perineal massage with enriched oil versus perineal massage with liquid wax

One study investigated the effect of massage to the perineum using a purified formula of almond oil with olive oil, rich with vitamin B1, B2, B6, E and fatty acid versus the use of a liquid wax [49].

Combined warm compress and perineal massage versus control

One study investigated the effect of the use of a warm compress and a massage versus routine care [48].

Vocalisation versus control

One study investigated the effect of vocalisation to maintain an open glottis during pushing and emitting sounds when exhaling, versus no vocalisation [57].

Combined warm compress and perineal massage versus perineal massage alone

One study investigated the effect of massage performed during contractions or pushes with a water-soluble lubricant plus the application of a moist warm compress between contractions or pushes, versus massage during contractions or pushes with water-soluble lubricant only [51].

Petroleum jelly versus control

One study investigated the effect of application of petroleum jelly to the clitoris, labia majora, labia minora, vestibule, fourchet and perineal body without stretching or massage of the perineum from time to time after complete cervical dilation, versus no application of jelly and no massage [42].

Perineal protection device versus control

Two studies investigated the use of a perineal protection device, which is inserted between the fetal head and the posterior vaginal wall with or without the use of lubricant gel during delivery of the fetal head, compared to standard care including manual perineal support, slow delivery of the fetal head and use of warm compresses when appropriate [41, 53]. In the study by André, the perineal protection device was altered to have slightly larger dimensions (10 mm wider and 8 mm longer) [41] than the version used by Lavesson [53].

Participants

All studies included pregnant women in the second stage of labour. Thirteen studies specified that only women with a singleton pregnancy were eligible [38, 42, 43, 44, 45, 48, 49, 51, 52, 54, 57, 58].

Outcomes

Fourteen studies reported second-degree tears [38, 41, 42, 43, 44, 47, 48, 49, 51, 53, 54, 57, 58, 60]. Ten studies reported third-degree

tears [38, 43, 44, 48, 49, 52, 53, 57, 58, 60]. Eight studies reported fourth-degree tears [38, 43, 44, 52, 53, 57, 58, 60]. Five studies reported combined third- or fourth-degree tears [36, 41, 45, 51, 54]. Four studies reported postpartum haemorrhage over 500 mL [38, 48, 51, 54]. One study reported maternal death [44]. Three studies reported perineal pain [45, 54, 57]. One study reported breastfeeding [54]. Four studies reported maternal satisfaction [45, 48, 51, 57]. Three studies reported side effects [47, 51, 53].

Excluded studies

We excluded 45 studies. This was usually due to the use of a perineal technique not being exclusively applied in the second stage of labour (n = 21), or the use of a technique that was not specifically applied to the perineum (n = 17). For example, three studies investigating the effect of the presence of two midwives versus one midwife were excluded as this was not deemed to be a perineal technique (Edqvist 2020 [61]; Edqvist 2022a [62]; Edqvist 2022b [63]). Other reasons for exclusion were ineligible study designs (n = 6) and ineligible patient population (n = 1).

The characteristics of the excluded studies and reasons for exclusion are outlined in Supplementary material 3.

Studies awaiting classification

After application of the Cochrane Pregnancy and Childbirth Trustworthiness Screening Tool (TST) to all eligible studies, we contacted study authors with any identified concerns to request further information [21]. Studies for which we have not received appropriate information to confirm their trustworthiness (as outlined in Figure 1) have been placed into awaiting classification. Detailed assessments of trustworthiness for these studies are available at OSF | Trustworthiness assessment for OSF.xlsx.

There are 23 studies awaiting classification due to a lack of information to confirm the trustworthiness of these studies. An additional study has been placed into awaiting classification as the method of randomisation was not clear (Thomas 2016 [64]). These are outlined in Supplementary material 4.

Ongoing studies

The nine ongoing studies are outlined in Supplementary material 5.

Risk of bias in included studies

Overall risk of bias

We assessed methodological risk of bias for 15 RCTs contributing results to all outcomes using the RoB 2 tool for RCTs. The studies contributed results for 10 outcomes:

- Second-degree tears
- Third-degree tears
- Fourth-degree tears
- Postpartum haemorrhage (PPH) ≥ 500 mL
- Breastfeeding at discharge
- Postpartum anaemia (Hb < 9 g/dL)
- Perineal pain
- Maternal satisfaction
- Maternal deaths
- Side effects

The risk of bias judgements are summarised below and presented in Supplementary material 6. Detailed consensus risk of bias assessments are available at OSF | ROB2 final.xlsm.

Overall risk of bias by outcome

Second-degree tears

We judged one study to be at low risk of bias for this outcome (Neta 2022). We judged 11 studies to have some concerns due to no trial registry or protocol being available, the method of randomisation being unclear, the analysis being unclear and often because how the outcome was measured was not specified, although there tends to be a standard way to measure tears (Albers 2005; André 2024; Araujo 2008; Califano 2022; Geranmayeh 2012; Goh 2021; Hong 2022; Lavesson 2014; McCandlish 1998; Stamp 2001; Terre-Rull 2014). Two studies were at high risk of bias due to having four domains with some concerns for reasons already specified, plus a lack of detail on randomisation (Attarha 2009; Harlev 2013).

Third-degree tears

We judged one study to be at low risk of bias for this outcome (Neta 2022). We judged seven studies to have some concerns due to no trial registry or protocol being available, the method of randomisation being unclear, the analysis being unclear and often because how the outcome was measured was not specified, although there tends to be a standard way to measure tears (Albers 2005; Califano 2022; Geranmayeh 2012; Goh 2021; Jönsson 2008; Stamp 2001; Terre-Rull 2014). Two studies were at high risk of bias due to having four domains with some concerns for reasons already specified, plus a lack of detail on randomisation (Attarha 2009; Harlev 2013).

Fourth-degree tears

We judged one study to be at low risk of bias for this outcome (Neta 2022). We judged six studies to have some concerns due to no trial registry or protocol being available, the method of randomisation being unclear, the analysis being unclear and often because how the outcome was measured was not specified, although there tends to be a standard way to measure tears (Albers 2005; Califano 2022; Geranmayeh 2012; Jönsson 2008; Stamp 2001; Terre-Rull 2014). One study was at high risk of bias due to having four domains with concerns for reasons already specified, plus a lack of detail on randomisation (Attarha 2009).

Third- and fourth-degree tears (combined)

We judged six studies to have some concerns due to lack of information on measurement of the outcome or lack of a pre-specified analysis plan (Aabakke 2016; André 2024; Dahlen 2007; Hong 2022; Lavesson 2014; McCandlish 1998).

PPH ≥ 500 mL

Four studies reported this outcome, and we judged all to have some concerns due to no protocol or trial registry information being available and because how the outcome was measured was not specified (Albers 2005; Goh 2021; Hong 2022; McCandlish 1998).

Breastfeeding at discharge

One study reported this outcome, and we judged it to have some concerns due to no protocol or trial registry information being available, a lack of specification of the outcome measurement

and because staff were not blind to the intervention received (McCandlish 1998).

Postpartum anaemia (Hb < 9 g/dL)

No studies reported this outcome.

Perineal pain

Three studies reported this outcome, and we judged all four studies to have some concerns due to the lack of a statistical analysis plan/trial registry/protocol and the inability to blind participants to the intervention; pain is a subjective outcome, so knowledge of the intervention could have affected the measurement of the outcome as it is self-reported (Dahlen 2007; McCandlish 1998; Neta 2022).

Maternal satisfaction

Four studies reported this outcome, and we judged all four studies to have some concerns due to the lack of a statistical analysis plan/trial registry/protocol and the inability to blind participants to the intervention; satisfaction is a subjective outcome, so knowledge of the intervention could have affected the measurement of the outcome as it is self-reported (Dahlen 2007; Goh 2021; Hong 2022; Neta 2022).

Maternal deaths

One study reported this outcome, which we judged to have some concerns as the outcome was not mentioned in the pre-specified trial registry (Califano 2022).

Side effects

We judged one study to have some concerns due to no trial registry or protocol being available, the method of randomisation being unclear, the analysis being unclear and because how the outcome was measured was not specified (Geranmayeh 2012). We judged a further study to have some concerns because how the outcome measure was measured was not specified and participants and personnel were not blind to the intervention (Lavesson 2014).

Synthesis of results

Please see Supplementary material 7.

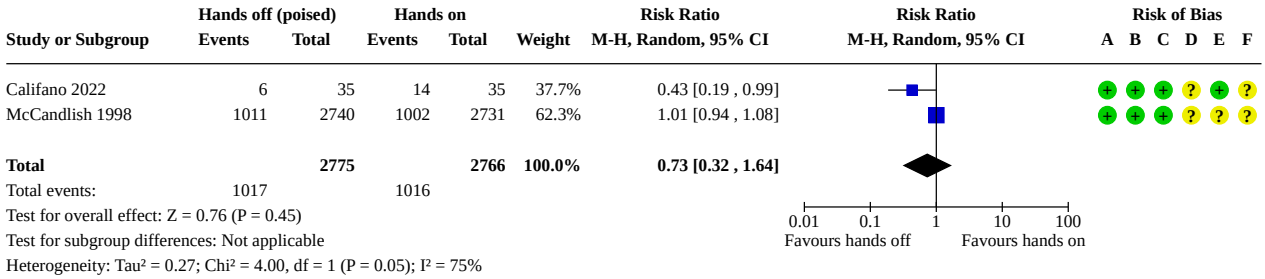
Hands off (or poised) versus hands on

Please see Summary of findings 1.

Tears

Hands off (poised) may result in little to no difference in second-degree tears (risk ratio (RR) 0.73, 95% confidence interval (CI) 0.32 to 1.64; 2 studies; low-certainty evidence; Analysis 1.1; Figure 3) or in third- or fourth-degree tears when data are combined (RR 1.27, 95% CI 0.81 to 1.99; 2 studies; low-certainty evidence; Analysis 1.2; Figure 4). The evidence is very uncertain about the effect of hands off (poised) on third-degree tears (RR 0.50, 95% CI 0.05 to 5.27; 1 study; very low-certainty evidence; Analysis 1.3; Figure 5) and fourth-degree tears when they are reported separately (RR 3.00, 95% CI 0.13 to 71.22; 1 study, very low-certainty evidence; Analysis 1.4; Figure 6).

Figure 3. Hands off (or poised) versus hands on: second-degree tears



Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

Figure 4. Hands off (or poised) versus hands on: third- or fourth-degree tears

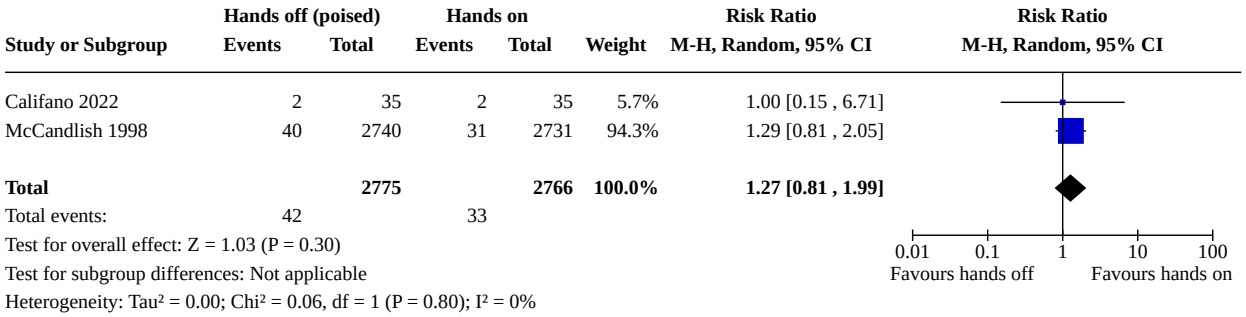


Figure 5. Hands off (or poised) versus hands on: third-degree tears

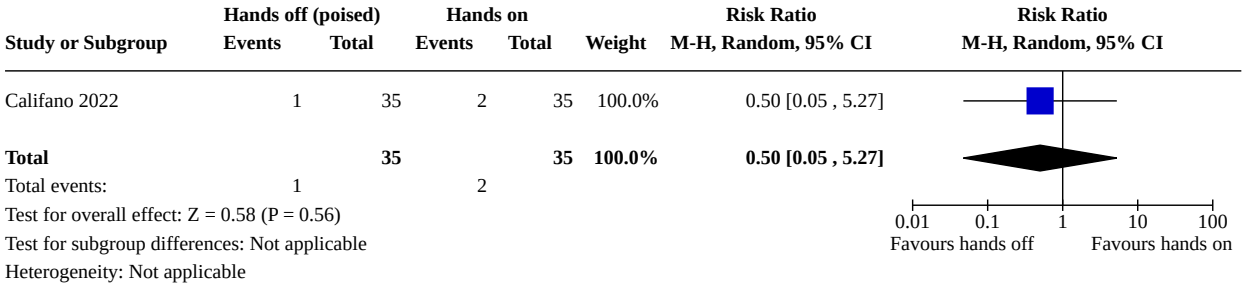
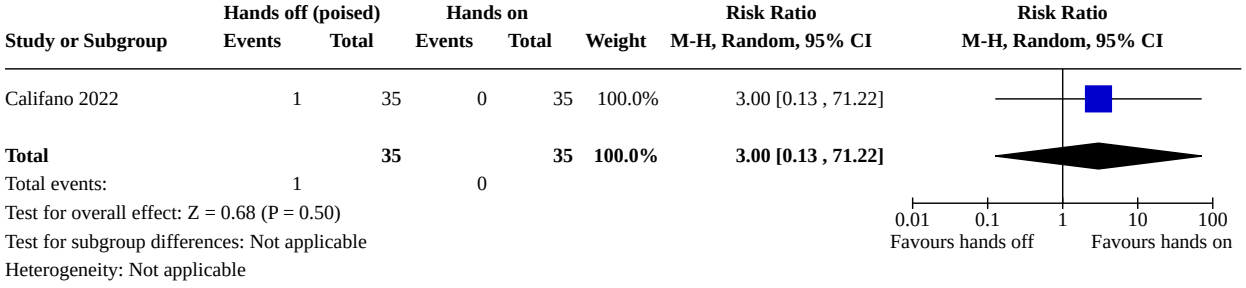


Figure 6. Hands off (or poised) versus hands on: fourth-degree tears



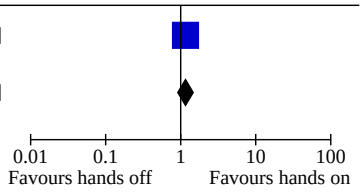
PPH ≥ 500 mL

The evidence suggests hands off (poised) may result in little to no difference in PPH ≥ 500 mL (RR 1.16, 95% CI 0.92 to 1.47; 1 study; low-certainty evidence; Analysis 1.5; Figure 7).

Figure 7. Hands off (or poised) versus hands on: PPH ≥ 500 mL

Study or Subgroup	Hands off (poised) Events	Total	Hands on Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
McCandlish 1998	143	2740	123	2731	100.0%	1.16 [0.92 , 1.47]
Total		**2740**		**2731**	**100.0%**	**1.16 [0.92 , 1.47]**
Total events:	143		123			

Test for overall effect: Z = 1.23 (P = 0.22)
Test for subgroup differences: Not applicable
Heterogeneity: Not applicable



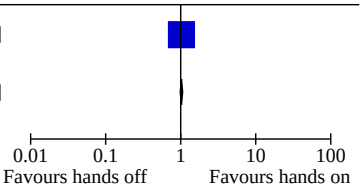
Breastfeeding

Hands off (poised) probably results in little to no difference in breastfeeding two days after birth (RR 1.02, 95% CI 0.99 to 1.06; 1 study; moderate-certainty evidence; Analysis 1.7; Figure 8).

Figure 8. Hands off (or poised) versus hands on: breastfeeding

Study or Subgroup	Hands off (poised) Events	Total	Hands on Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
McCandlish 1998[a]	1886	2740	1837	2731	100.0%	1.02 [0.99 , 1.06]
Total		**2740**		**2731**	**100.0%**	**1.02 [0.99 , 1.06]**
Total events:	1886		1837			

Test for overall effect: Z = 1.24 (P = 0.21)
Test for subgroup differences: Not applicable
Heterogeneity: Not applicable



Footnotes

[a]Full and partial breastfeeding at 2 days after birth.

Maternal death

Evidence from one trial with 70 participants and zero deaths suggests that hands off (poised) may result in little to no effect on maternal deaths (low-certainty evidence; Analysis 1.8).

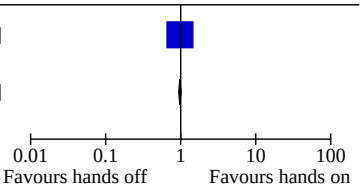
Perineal pain

Hands off (poised) probably results in little to no difference in perineal pain (RR 0.98, 95% CI 0.94 to 1.01; 1 study; moderate-certainty evidence; Analysis 1.6; Figure 9).

Figure 9. Hands off (or poised) versus hands on: perineal pain

Study or Subgroup	Hands off (poised) Events	Total	Hands on Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
McCandlish 1998[a]	1871	2685	1915	2686	100.0%	0.98 [0.94 , 1.01]
Total		**2685**		**2686**	**100.0%**	**0.98 [0.94 , 1.01]**
Total events:	1871		1915			

Test for overall effect: Z = 1.30 (P = 0.20)
Test for subgroup differences: Not applicable
Heterogeneity: Not applicable



Footnotes

[a]Postnatal pain in and around the perineum in the previous 24 hours reported at 2 days as 'some pain'. Data in the trial report is further brokwn down as mild, n

No studies measured PPH ≥ 1000 mL, additional uterotonics, blood transfusion, severe morbidity, side effects, maternal satisfaction, maternal wellbeing or postpartum anaemia (Hb < 9 g/dL).

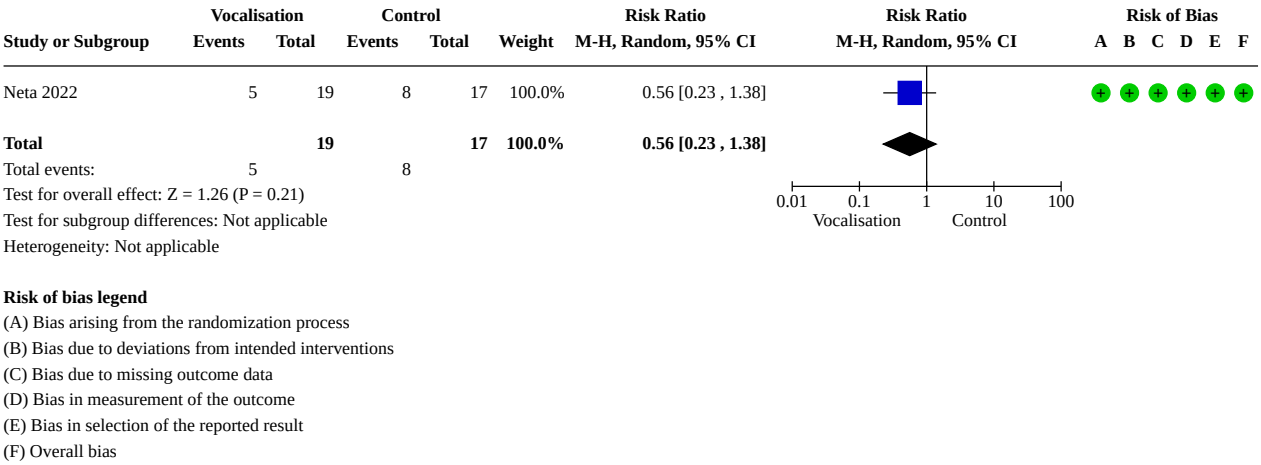
Vocalisation versus control

Please see Summary of findings 2.

Tears

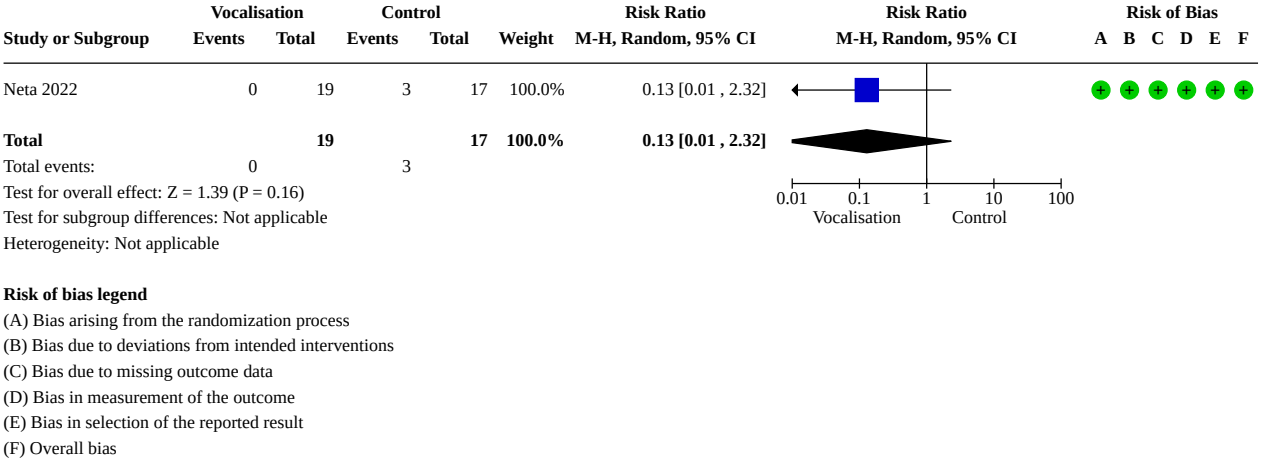
Vocalisation may result in a reduction in second-degree tears but the CIs are wide and include the possibility of no effect (RR 0.56, 95% CI 0.23 to 1.38; 1 study; low-certainty evidence; Analysis 2.1; Figure 10). Vocalisation may result in a reduction in third-degree tears but the CIs are wide and include the possibility of no effect (RR 0.13, 95% CI 0.01 to 2.32; 1 study; low-certainty evidence; Analysis 2.2; Figure 11). Vocalisation may result in little to no difference in fourth-degree tears as no events were reported for this outcome (Analysis 2.3, Figure 12).

Figure 10. Vocalisation versus control: second-degree tears



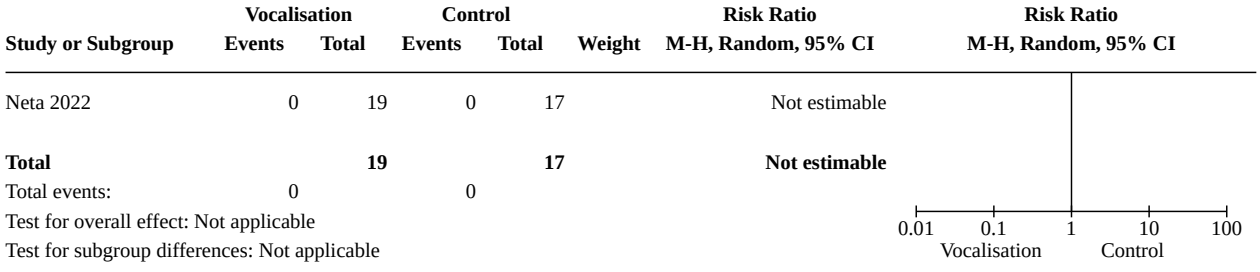
Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

Figure 11. Vocalisation versus control: third-degree tears



Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

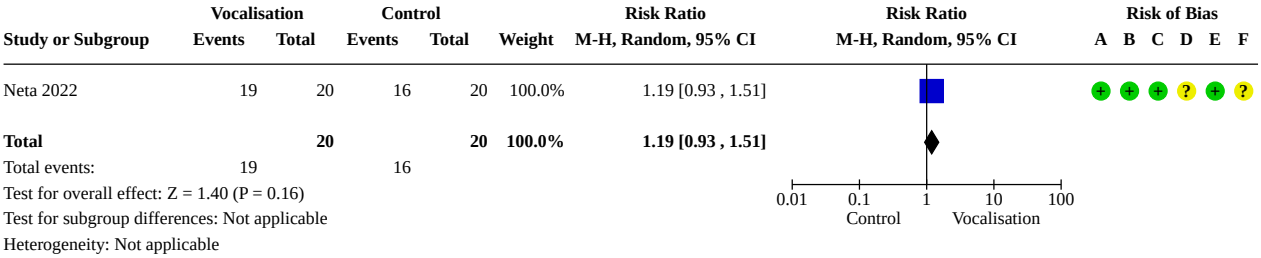
Figure 12. Vocalisation versus control: fourth-degree tears



Maternal satisfaction

Vocalisation may increase maternal satisfaction (RR 1.19, 95% CI 0.93 to 1.51; 1 study; low-certainty evidence; Analysis 2.4; Figure 13).

Figure 13. Vocalisation versus control: maternal satisfaction

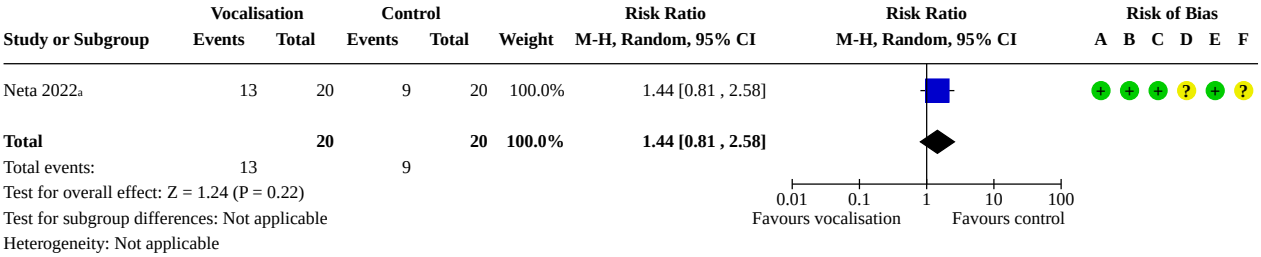


Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

Perineal pain

The evidence is very uncertain about the effect of vocalisation on perineal pain (RR 1.44, 95% CI 0.81 to 2.58; 1 study; very low-certainty evidence; Analysis 2.5; Figure 14).

Figure 14. Vocalisation versus control: perineal pain



Footnotes
[a]Presence of postpartum perineal pain

Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

No studies measured PPH ≥ 500 mL, PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, side effects, maternal wellbeing, breastfeeding at discharge or postpartum anaemia (Hb < 9 g/dL).

Warm compress versus control (hands off or no warm compress)

Please see Summary of findings 3.

Tears

The evidence suggests that warm compress may result in little to no difference in second-degree tears (RR 0.94, 95% CI 0.72 to 1.21; 2 studies; low-certainty evidence; Analysis 3.1; Figure 15). Warm compress likely results in a reduction in third- or fourth-degree tears (RR 0.46, 95% CI 0.27 to 0.79; 3 studies; moderate-certainty evidence; Analysis 3.2; Figure 16). The evidence is very uncertain about the effect of warm compress on third-degree tears (RR 0.51,

95% CI 0.04 to 7.05; 2 studies; very low-certainty evidence; Analysis 3.3; Figure 17) and on fourth-degree tears (RR 0.11, 95% CI 0.01 to 2.06; 2 studies; very low-certainty evidence; Analysis 3.4; Figure 18) when data are reported separately. This is due to the addition of one large study that reports third- and fourth-degree tears combined [45].

Figure 15. Warm compresses versus control (hands off or no warm compress): second-degree tears

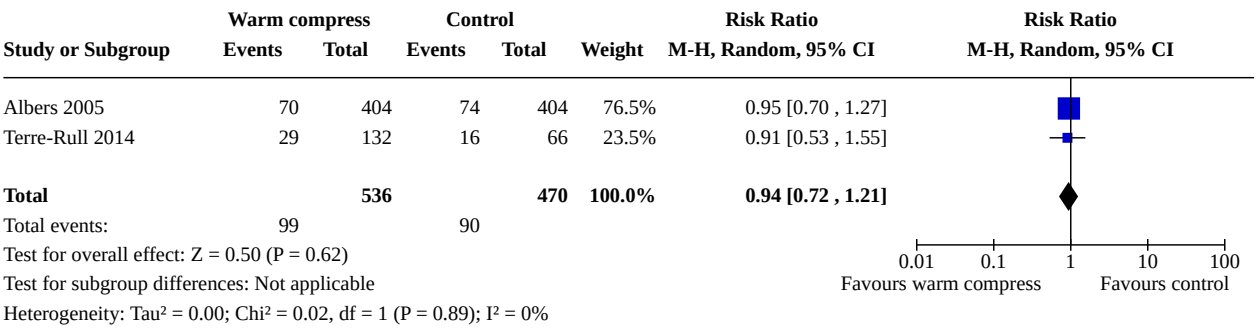
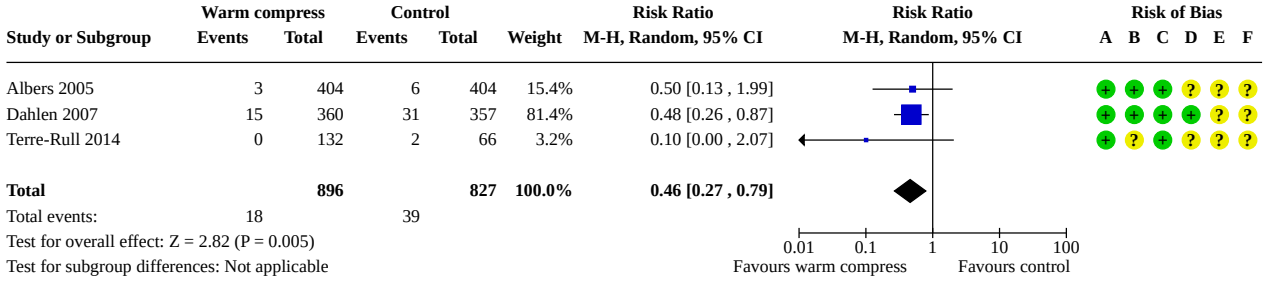


Figure 16. Warm compresses versus control (hands off or no warm compress): third- or fourth-degree tears



Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

Figure 17. Warm compresses versus control (hands off or no warm compress): third-degree tears

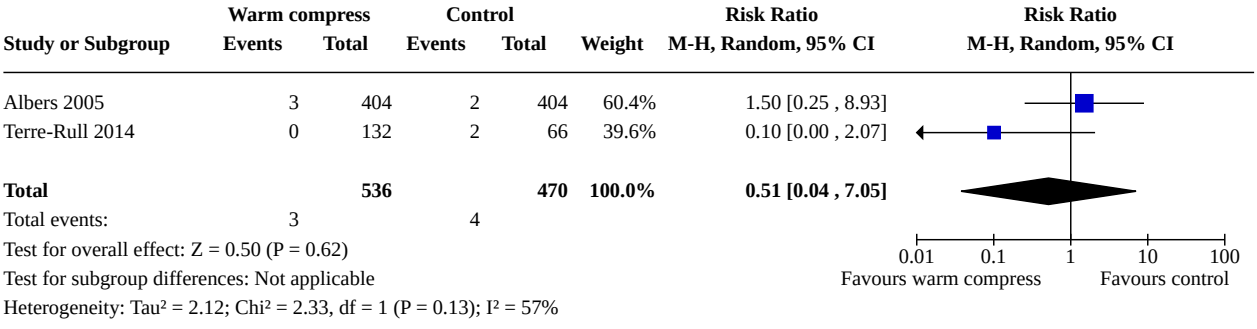
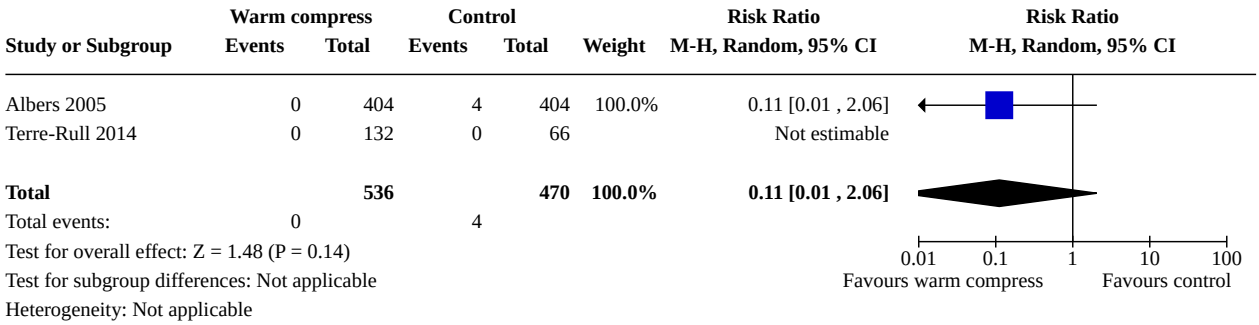


Figure 18. Warm compresses versus control (hands off or no warm compress): fourth-degree tears



PPH ≥ 500 mL

One study reported 10 participants with postpartum haemorrhage across three interventions (warm compress, massage, control). We were unable to calculate the risk ratio as we were unable to disaggregate the data for each group (Albers 2005)

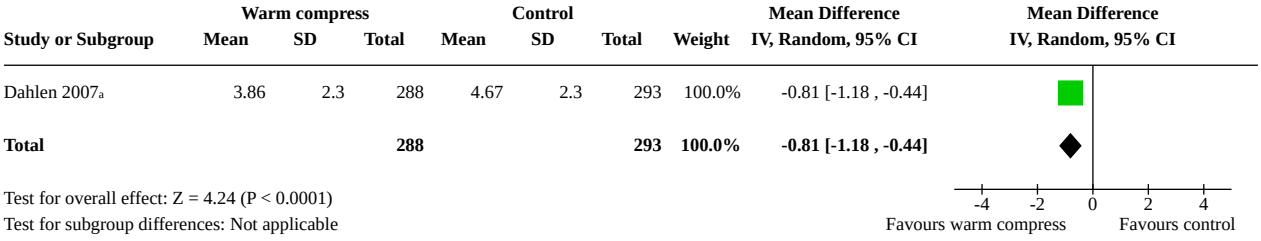
Maternal satisfaction

Regarding maternal satisfaction, 89.1% of women reported increased comfort with the use of warm compress; 56% of women reported that they felt more in control of the second stage of labour due to the warm compress and 1.9% of women reported that they disliked the warm compress 'a lot'. No data were collected for controls, so no comparison was possible (Dahlen 2007).

Perineal pain

Warm compress likely results in a large reduction in perineal pain (MD -0.81, 95% CI -1.18 to -0.44; 1 study; moderate-certainty evidence; Analysis 3.5; Figure 19).

Figure 19. Warm compresses versus control (hands off or no warm compress): perineal pain



Footnotes

[a]Pain score at day 1 based on a 0 to 10 visual analogue scale

No studies measured PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, side effects, maternal wellbeing, breastfeeding at discharge or postpartum anaemia (Hb < 9 g/dL).

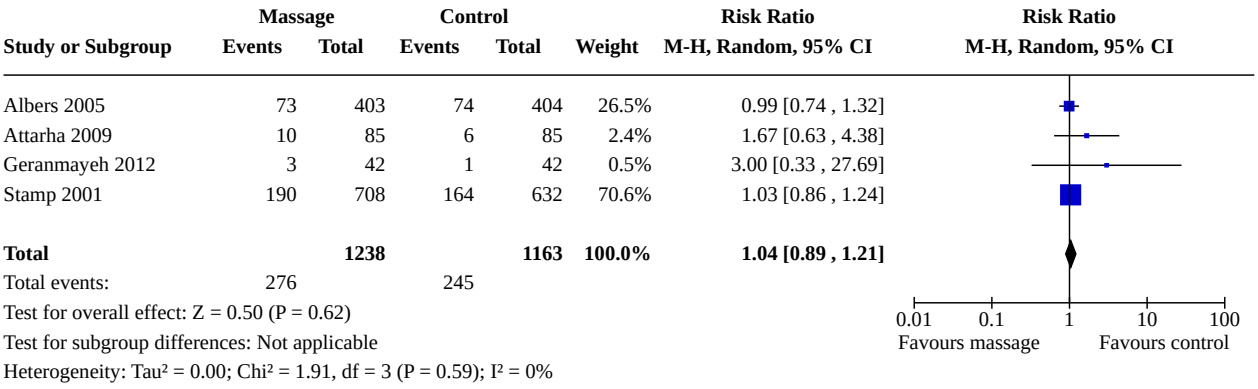
Perineal massage versus control (hands off or no usual care)

Please see Summary of findings 4.

Tears

Massage of the perineum may have little to no effect on second-degree tears (RR 1.04, 95% CI 0.89 to 1.21; 4 studies; low-certainty evidence; Analysis 4.1; Figure 20). The evidence is very uncertain about the effect of massage on third-degree tears (RR 0.57, 95% CI 0.16 to 2.02; 4 studies; very low-certainty evidence; Analysis 4.2; Figure 21). Massage of the perineum may reduce fourth-degree tears but the CIs are wide and include the possibility of no effect (RR 0.26, 95% CI 0.04 to 1.61; 4 studies; low-certainty evidence; Analysis 4.3; Figure 22).

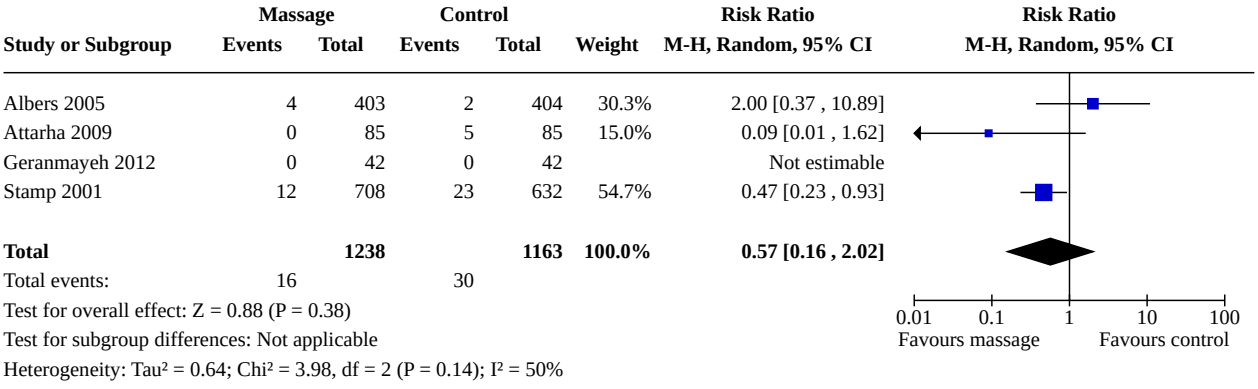
Figure 20. Massage versus control (hands off or care as usual): second-degree tears



Study or Subgroup	Massage Events	Massage Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Albers 2005	73	403	74	404	26.5%	0.99 [0.74 , 1.32]
Attarha 2009	10	85	6	85	2.4%	1.67 [0.63 , 4.38]
Geranmayeh 2012	3	42	1	42	0.5%	3.00 [0.33 , 27.69]
Stamp 2001	190	708	164	632	70.6%	1.03 [0.86 , 1.24]
Total		**1238**		**1163**	**100.0%**	**1.04 [0.89 , 1.21]**
Total events:	276		245			

Test for overall effect: Z = 0.50 (P = 0.62)
Test for subgroup differences: Not applicable
Heterogeneity: Tau² = 0.00; Chi² = 1.91, df = 3 (P = 0.59); I² = 0%

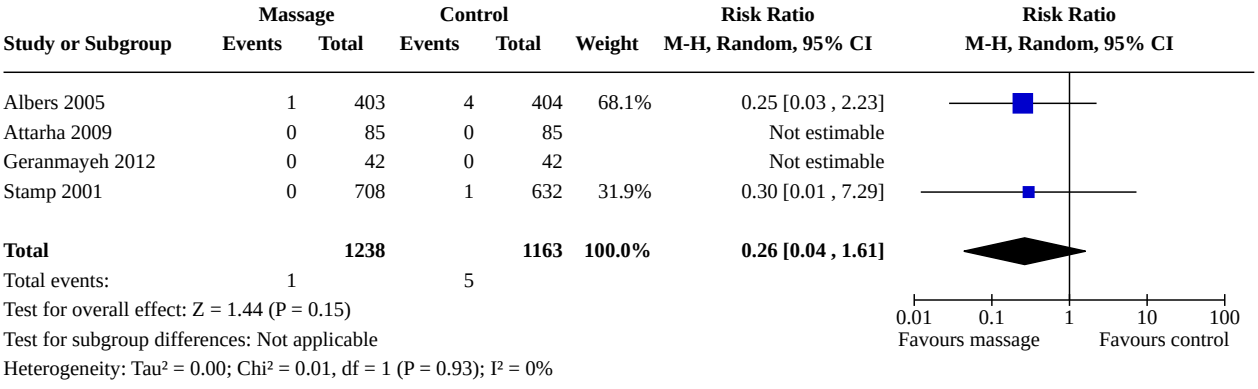
Figure 21. Massage versus control (hands off or care as usual): third-degree tears



Study or Subgroup	Massage Events	Massage Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Albers 2005	4	403	2	404	30.3%	2.00 [0.37 , 10.89]
Attarha 2009	0	85	5	85	15.0%	0.09 [0.01 , 1.62]
Geranmayeh 2012	0	42	0	42		Not estimable
Stamp 2001	12	708	23	632	54.7%	0.47 [0.23 , 0.93]
Total		**1238**		**1163**	**100.0%**	**0.57 [0.16 , 2.02]**
Total events:	16		30			

Test for overall effect: Z = 0.88 (P = 0.38)
Test for subgroup differences: Not applicable
Heterogeneity: Tau² = 0.64; Chi² = 3.98, df = 2 (P = 0.14); I² = 50%

Figure 22. Massage versus control (hands off or care as usual): fourth-degree tears



Study or Subgroup	Massage Events	Massage Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Albers 2005	1	403	4	404	68.1%	0.25 [0.03 , 2.23]
Attarha 2009	0	85	0	85		Not estimable
Geranmayeh 2012	0	42	0	42		Not estimable
Stamp 2001	0	708	1	632	31.9%	0.30 [0.01 , 7.29]
Total		**1238**		**1163**	**100.0%**	**0.26 [0.04 , 1.61]**
Total events:	1		5			

Test for overall effect: Z = 1.44 (P = 0.15)
Test for subgroup differences: Not applicable
Heterogeneity: Tau² = 0.00; Chi² = 0.01, df = 1 (P = 0.93); I² = 0%

PPH ≥ 500 mL

One study reported 10 participants with postpartum haemorrhage across three interventions (warm compress, massage, control). We were unable to calculate the risk ratio as we were unable to disaggregate data for each group (Albers 2005).

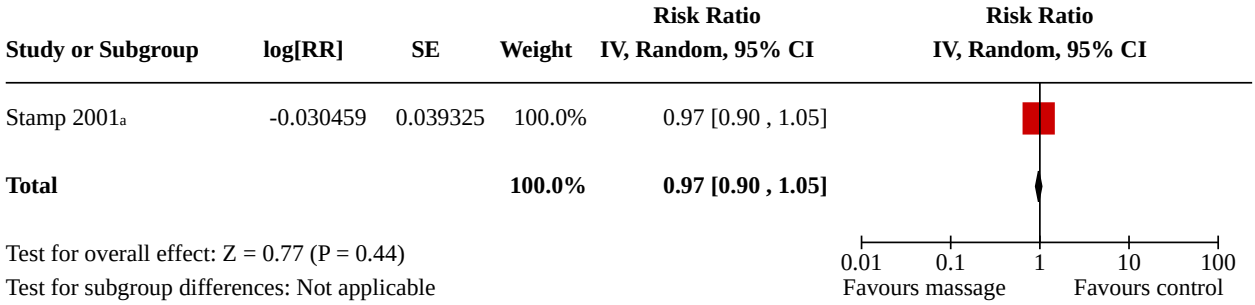
Side effects

One study reported that "Within 10 days of delivery, the massage group showed no side effects associated with Vaseline and less than 10% of mothers in both the groups experienced effects such as burning, pain and inflammation at the perineum, which was not significantly different, however, in the two groups (P = 0.528)". The evidence was very low-certainty (Geranmayeh 2012).

Perineal pain

One study reported vaginal pain at 3 days, 10 days and 3 months. The evidence suggests that massage likely results in little to no difference in perineal pain (RR 0.97, 95% CI 0.90 to 1.05; 1 study; moderate-certainty evidence; Analysis 4.4; Figure 23).

Figure 23. Massage versus control (hands off or care as usual): pain



Test for overall effect: Z = 0.77 (P = 0.44)
Test for subgroup differences: Not applicable
Heterogeneity: Not applicable

Footnotes

[a]Vaginal pain at 3 days

No studies measured PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, maternal satisfaction, maternal wellbeing, breastfeeding at discharge or postpartum anaemia (Hb < 9 g/dL).

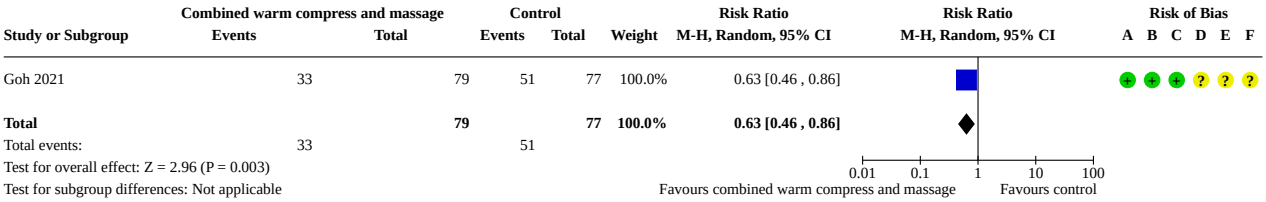
Combined warm compress and perineal massage versus control

Please see Summary of findings 5.

Tears

Combined warm compress and massage likely results in a reduction in second-degree tears (RR 0.63, 95% CI 0.46 to 0.86; 1 study; moderate-certainty evidence; Analysis 5.1; Figure 24). The evidence is very uncertain about the effect of combined warm compress and massage on third-degree tears (RR 2.92, 95% CI 0.12 to 70.72; 1 study; very low-certainty evidence; Analysis 5.2; Figure 25).

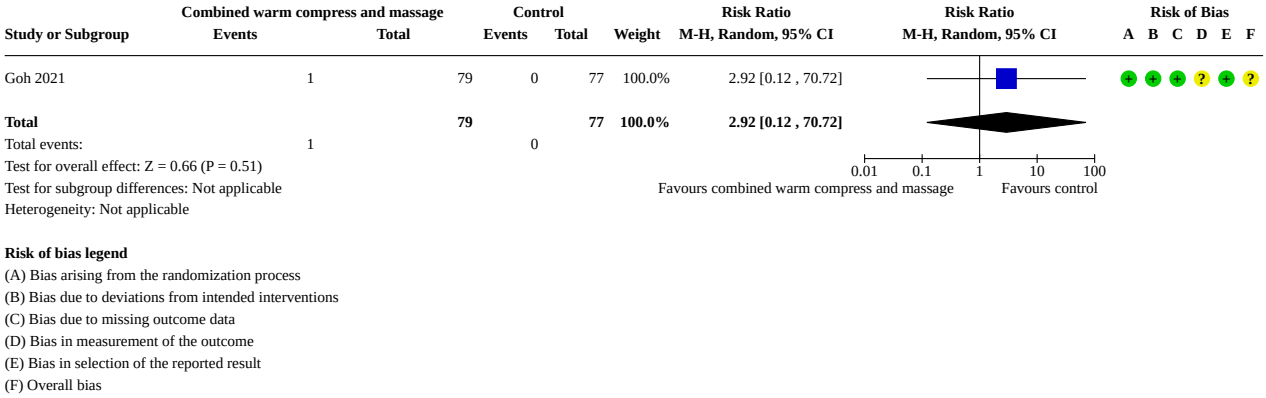
Figure 24. Combined warm compress and massage versus control: second-degree tears



Test for overall effect: Z = 2.96 (P = 0.003)
Test for subgroup differences: Not applicable
Heterogeneity: Not applicable

Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

Figure 25. Combined warm compresses and massage versus control: third-degree tears

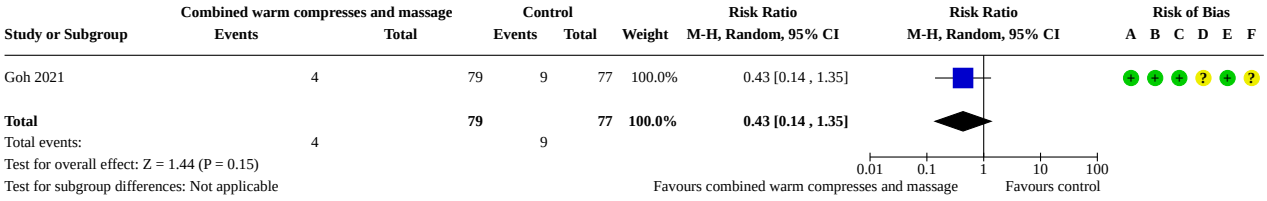


Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

PPH ≥ 500 mL

Combined warm compress and massage may result in a reduction in PPH ≥ 500 mL but the CIs are wide and include the possibility of no effect (RR 0.43, 95% CI 0.14 to 1.35; 1 study; low-certainty evidence; Analysis 5.4; Figure 26).

Figure 26. Combined warm compresses and massage versus control: PPH ≥ 500 mL

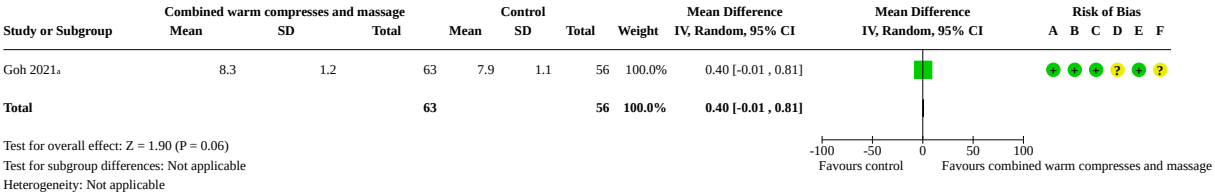


Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

Maternal satisfaction

Combined warm compress and massage likely results in an increase in maternal satisfaction (MD 0.40, 95% CI -0.01 to 0.81; 1 study; moderate-certainty evidence; Analysis 5.3; Figure 27).

Figure 27. Combined warm compress and massage versus control: maternal satisfaction



Footnotes
[a]Strict per protocol analysis; cesarean and instrumental vaginal delivery excluded. 11-point visual numerical rating score with 0 representing completely dissatisfied and 10 representing completely satisfied.

Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

No studies measured fourth-degree tears, PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, side effects, maternal wellbeing, breastfeeding at discharge, postpartum anaemia (Hb < 9 g/dL) or perineal pain.

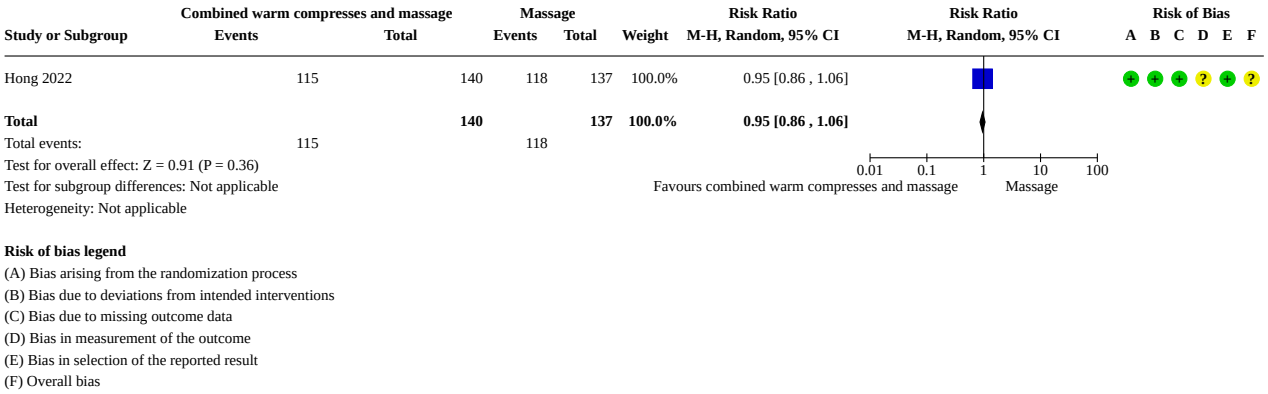
Combined warm compress and perineal massage versus perineal massage alone

Please see Summary of findings 6.

Tears

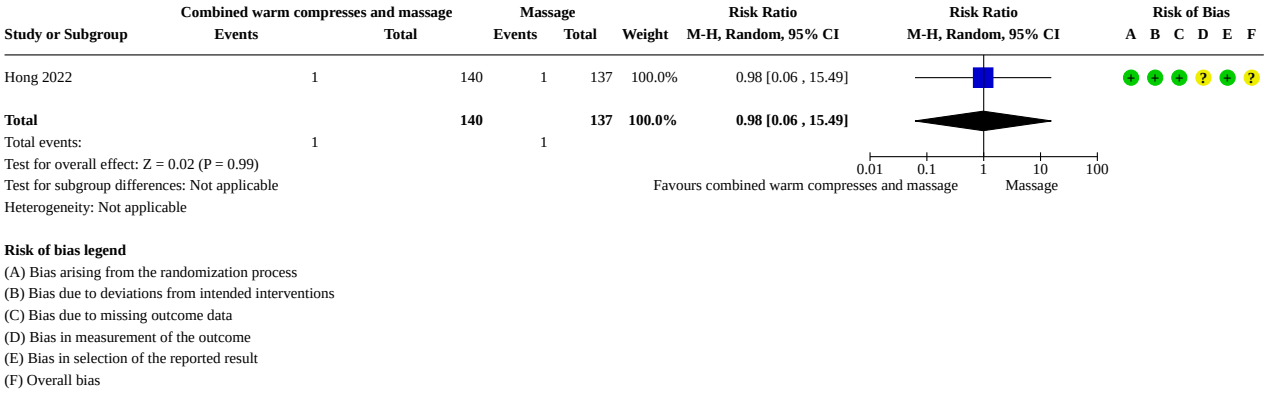
Combined warm compress and massage may result in little to no difference in second-degree tears (RR 0.95, 95% CI 0.86 to 1.06; 1 study; low-certainty evidence; Analysis 6.1; Figure 28). The evidence is very uncertain about the effect of combined warm compress and massage on third- or fourth-degree tears (RR 0.98, 95% CI 0.06 to 15.49; 1 study; very low-certainty evidence; Analysis 6.2; Figure 29).

Figure 28. Combined warm compress and massage versus massage alone: second-degree tears



Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

Figure 29. Combined warm compress and massage versus massage alone: third- or fourth-degree tears

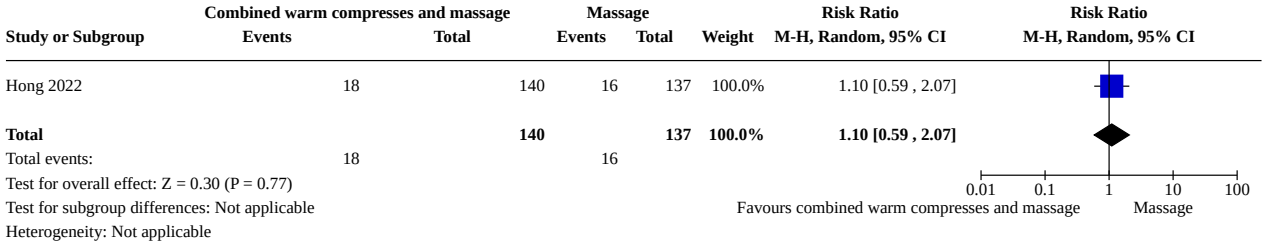


Risk of bias legend
(A) Bias arising from the randomization process
(B) Bias due to deviations from intended interventions
(C) Bias due to missing outcome data
(D) Bias in measurement of the outcome
(E) Bias in selection of the reported result
(F) Overall bias

PPH ≥ 500 mL

Combined warm compress and massage may result in little to no difference in PPH > 500 mL (RR 1.10, 95% CI 0.59 to 2.07; 1 study; low-certainty evidence; Analysis 6.3; Figure 30).

Figure 30. Combined warm compress and massage versus massage alone: PPH ≥ 500 mL



Side effects

No side effects occurred in either group (1 study, low-certainty evidence) (Hong 2022).

Maternal satisfaction

One study reported that "maternal satisfaction with intervention was measured using an 11-point visual numerical score of 0 (completely dissatisfied) to 10 (completely satisfied). The median (interquartile range) was 7 (6 to 8) in the massage and warm compress group and 6 (5 to 8) in the massage only group" (low-certainty evidence) (Hong 2022).

No studies measured PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, maternal wellbeing, breastfeeding at discharge, postpartum anaemia (Hb < 9 g/dL) or perineal pain.

Ritgen's manoeuvre versus standard care

Please see Ritgen's manoeuvre vs. standard care summary of findings table.

Tears

Ritgen's manoeuvre may result in little to no difference in third-degree tears (RR 1.42, 95% CI 0.86 to 2.36; 1 study, low-certainty evidence, Analysis 7.1) or fourth-degree tears (RR 0.60, 95% CI 0.18 to 2.03; 1 study, low-certainty evidence, Analysis 7.2).

No studies measured second-degree tears, PPH ≥ 500 mL, PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, side effects, maternal satisfaction, maternal wellbeing, breastfeeding at discharge, postpartum anaemia (Hb < 9 g/dL) or perineal pain.

Primary delivery of posterior versus anterior shoulder

Please see primary delivery of posterior shoulder vs. primary delivery of anterior shoulder summary of findings table.

Tears

Posterior shoulder may result in little to no difference in third- or fourth-degree tears (RR 0.81, 95% CI 0.39 to 1.67; 1 study; low-certainty evidence; Analysis 8.1).

No studies measured second-degree tears, PPH ≥ 500 mL, PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, side effects, maternal satisfaction, maternal wellbeing, breastfeeding at discharge, postpartum anaemia (Hb < 9 g/dL) or perineal pain.

Perineal massage with enriched oil versus perineal massage with liquid wax

Please see massage of the perineum with enriched oil vs. liquid wax summary of findings table.

Tears

Massage with enriched oil may result in little to no difference in second-degree tears (RR 0.88, 95% CI 0.58 to 1.31; 1 study; low-certainty evidence; Analysis 9.1). The evidence is very uncertain about the effect of massage with enriched oil on third-degree tears (RR 1.50, 95% CI 0.26 to 8.74; 1 study; very low-certainty evidence; Analysis 9.2).

No studies measured fourth-degree tears, PPH ≥ 500 mL, PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, side effects, maternal satisfaction, maternal wellbeing, breastfeeding at discharge, postpartum anaemia (Hb < 9 g/dL) or perineal pain.

Petroleum jelly versus control

Please see petroleum jelly on the perineum vs. control summary of findings table.

Tears

The evidence is very uncertain about the effect of petroleum jelly on second-degree tears (RR 1.53, 95% CI 0.59 to 4.00; 1 study; very low-certainty evidence; Analysis 10.1).

No studies measured third-degree tears, fourth-degree tears, PPH ≥ 500 mL, PPH ≥ 1000 mL, additional uterotonics, blood transfusion, maternal death, severe morbidity, side effects, maternal satisfaction, maternal wellbeing, breastfeeding at discharge, postpartum anaemia (Hb < 9 g/dL) or perineal pain.

Perineal protection device versus control

Please see perineal protection device vs. control summary of findings table.

Tears

The use of a perineal protection device during delivery of the fetal head may result in little to no difference in the reduction of first- and second-degree perineal tears (RR 0.88, 95% CI 0.69 to 1.13; 2 studies; 1190 participants; low-certainty evidence; Analysis 11.1), or second-degree tears (RR 0.68, 95% CI 0.42 to 1.12; 1 study, 92 participants; low-certainty evidence; Analysis 11.2), compared to control. The evidence is very uncertain about the effect of a perineal protection device on third- or fourth-degree tears (RR 0.72, 95%

CI 0.18 to 2.94; 2 studies, 1190 participants; very low-certainty evidence; Analysis 11.3).

Side effects

In one study (Lavesson 2014), it was reported that no side effects were reported by any participant. Three out of 18 birth attendants in this study reported difficulty inserting the device, and one participant reported discomfort during insertion.

Reporting biases

It was not possible to assess reporting biases formally through a funnel plot as too few studies were included in the meta-analyses. We checked trial registries when information was available to ensure pre-specified outcomes were reported and included in the review.

DISCUSSION

Summary of main results

This review aimed to evaluate the evidence for the effect of different perineal techniques enacted during the second stage of labour on perineal trauma and postpartum complications. We included 17 studies, including 13,695 women. Trials were conducted in 11 different countries, all in hospital settings. Perineal techniques assessed included: warm compresses applied to the perineum, perineal massage, hands on techniques compared to hands off, the application of different lubricants to the perineum including oil, liquid wax and petroleum jelly, vocalisation to maintain an open glottis during pushing and emitting sounds when exhaling, a modified Ritgen's manoeuvre, primary delivery of the posterior shoulder and the use of perineal protection devices. These were compared to usual care, control or other perineal techniques.

The effects of perineal techniques in reducing perineal trauma and postpartum complications were largely uncertain. The comparison of hands on versus hands off techniques demonstrated little to no difference in effect between the two techniques on perineal tears, PPH, breastfeeding and perineal pain. The comparison of massage with control demonstrated little to no effect on second-degree perineal tears, and evidence for third- and fourth-degree tears was highly heterogenous. This intervention may also have no effect on PPH ≥ 500 mL and perineal pain.

The evidence for warm compress versus control was heterogeneous, as the pooled effects from two studies conducted in the USA and Spain suggested little to no effect on perineal tears; however, they reported very few events (Albers 2005; Terre-Rull 2014). In contrast, one larger study conducted in Australia reported a large reduction in third- and fourth-degree tears, which resulted in a moderate-certainty conclusion that this intervention likely reduces perineal tears of this degree (Dahlen 2007). Evidence from this study also suggests that warm compress likely reduces perineal pain, and women exposed to the intervention reported increased comfort and feeling 'in control' during late labour. The evidence for the effect of this intervention on PPH and maternal satisfaction is very uncertain.

Vocalisation was found to reduce perineal tears compared to control, but the certainty of the evidence was low. There was low-certainty evidence that this intervention improves maternal satisfaction and the evidence was very uncertain about the effect of vocalisation on perineal pain.

Compared to control, evidence for combined warm compress and massage also suggested some beneficial effect on the reduction in second-degree tears, an increase in maternal satisfaction and a potential reduction in PPH ≥ 500 mL. Evidence for the effect on third-degree tears is very uncertain. Interestingly, when compared to massage alone, the evidence for combined warm compress and massage suggested there may be little to no difference in the effect on perineal tears and maternal satisfaction.

Limitations of the evidence included in the review

Improving care to minimise perineal trauma and associated excessive blood loss is important to reduce adverse outcomes and optimise women's childbirth experiences. Although a large number of women were included in this review, within most comparisons the sample sizes were small and the evidence was insufficient to enable us to draw reliable conclusions. There is no high-certainty evidence for perineal techniques during the second stage of labour to reduce perineal trauma and postpartum complications, largely due to imprecise effect estimates and concerns related to bias in the studies.

Additionally, very few important outcomes were reported in any of the included studies. No studies reported major PPH ≥ 1000 mL, requirement for additional uterotonics, blood transfusion, severe morbidity, maternal wellbeing or postpartum anaemia (Hb < 9 g/dL). Only four studies reported postpartum haemorrhage over 500 mL (Albers 2005; Goh 2021; Hong 2022; McCandlish 1998). Similarly, acceptability to women is an important contributor to evaluations of effectiveness; however, only four studies addressed women's experiences, finding no difference in satisfaction between the techniques (Dahlen 2007; Goh 2021; Hong 2022; Neta 2022). Further research is required to ascertain which techniques improve core outcomes [19], and are acceptable to women and health workers.

The studies in our meta-analyses included a variety of perineal techniques. Across studies, considerable heterogeneity was present with a lack of definition of interventions and standardisation of implementation. For example, for 'hands off', Albers 2005 specified no touching of the perineum until crowning of the head, whilst McCandlish 1998 and Califano 2022 included spontaneous birth of the shoulders in addition to not touching the perineum or fetal head. 'Hands on' manual support techniques were also poorly described in most of the studies, although all techniques included touch aimed at controlled birth of the head.

Due to the nature of the intervention, it was not possible to blind the midwives or birth attendants in the included trials. Although it may be difficult, it is not impossible to blind the outcome assessor, so future trials should attempt this. This is important as, theoretically, midwives' convictions about the advantage or disadvantage of the intervention could influence their evaluation of the perineal outcome.

We downgraded the certainty of the evidence for 'hands off' techniques compared to 'hands on' because of some concerns about risk of bias in one study (McCandlish 1998) and wide CIs due to a small number of studies included (one or two studies).

We downgraded the evidence for warm compress compared to control due to some concerns about risk of bias because of the lack of pre-specified analysis plans, unblinded assessment of the outcomes and wide CIs.

The evidence for the effect of massage was very uncertain, and we downgraded this as the risk of bias was judged of some concern for three studies, and high for one study (Attarha 2009). Results were also inconsistent, with some studies reporting strong beneficial effects of massage, but others reporting no effect or negative effects.

We downgraded the certainty of the evidence for combined warm compress and massage due to wide CIs and some concerns about risk of bias. Outcomes were not prespecified and knowledge of the intervention received could have affected the self-reported measurement of the outcome by patients.

Birth of the posterior shoulder first, Ritgen's manoeuvre, use of topical lubricants, vocalisation and use of combined warm compress and massage compared to massage had little or no impact, or the evidence was very uncertain for all outcomes.

We extracted information on the country where the study was conducted as a proxy for health inequity. Studies were conducted in Italy (Califano 2022), the UK (McCandlish 1998), the USA (Albers 2005), Spain (Terre-Rull 2014), Australia (Dahlen 2007; Stamp 2001), Iran (Attarha 2009; Geranmayeh 2012), Malaysia (Goh 2021; Hong 2022), Sweden (André 2024; Lavesson 2014; Jönsson 2008), Denmark (Aabakke 2016), Israel (Harlev 2013) and Brazil.

Limitations of the review processes

After implementing Cochrane's trustworthiness tool [21], we moved 23 eligible studies to awaiting assessment due to limitations on the data reported in the studies, no details on trial registration and queries regarding study characteristics and outcome data. We have contacted trial authors for further information.

One of the conditions of the trustworthiness tool used in this review is that any study submitted for publication from 2010 should have prospective trial registration. This means that any study published before this date does not have to meet these criteria, and it is important to note that half of the studies included in this review were conducted prior to 2010 and may therefore have been included despite lack of prospective registration.

Due to the limited timeframe to undertake this review in order to ensure that it was available for the WHO guideline development group meeting, translation is ongoing for a further four further studies.

Agreements and disagreements with other studies or reviews

Several reviews have summarised the evidence for perineal techniques but none have considered postpartum haemorrhage as an outcome.

Overall, some of the conclusions of this review are consistent with the previous version [13], such as the application of warm perineal compress likely resulting in a reduction in third- or fourth-degree tears. However, the evidence for perineal massage in reducing trauma is now very uncertain. For other techniques there were fewer included studies and the evidence for the effect on most outcomes was limited or uncertain, which corresponds with the previous version of this review.

Aquino et al compared perineal massage to control, including nine trials with 3374 women [65]. Women randomised to receive perineal massage during labour had a reduced risk of severe perineal trauma, compared to those who did not. This broadly agreed with the results of our review, although the certainty of the evidence was not assessed.

The evidence for the use of warm compress compared to usual care in the second stage of labour agrees with a review by Magoga et al involving a meta-analysis of seven trials, including 2103 participants, which reported that warm compresses reduced the risk of severe perineal trauma but found no difference in rates of second-degree tears [17].

Pierce-Williams et al compared 'hands on' to 'hands off' techniques, including five trials with 7287 women [66]. They found no significant differences in rates of second- or fourth-degree tears, consistent with our review. However, the 'hands on' technique was associated with an increased risk of third-degree tears compared to 'hands off', but these findings were limited by low-quality evidence. Our review demonstrated very uncertain evidence for the effects of 'hands off' techniques on rates of third-degree tears.

In contrast to our review findings, a recent review by Venugopal et al reported a reduced risk of severe perineal trauma with perineal massage during labour compared to controls in 10 trials including 4088 women [16]. This difference may relate to our use of Cochrane's Trustworthiness Tool, which resulted in fewer studies being eligible for inclusion. Venugopal et al stated that the methodological quality of the included studies was inadequate, but as the risk of bias or methodological quality tool used was not stated, and no justifications were given for this assessment, the certainty of the evidence was not assessed [16].

AUTHORS' CONCLUSIONS

Implications for practice

Overall, the evidence for the effectiveness of perineal techniques to reduce perineal trauma and postpartum haemorrhage is very uncertain. There is no evidence to suggest that any one perineal technique is advantageous over any other across effectiveness and acceptability outcomes.

Implications for research

Very few studies reported rates of postpartum haemorrhage, adverse events, women's or health workers' experience, or other important outcomes that allow us to understand the effectiveness and acceptability of perineal techniques to reduce perineal trauma.

Prior to any further large trials, research is needed to clarify the types of interventions being investigated, including a clear description of the process of development and the involvement of relevant stakeholders. There is a need to explore how the intervention is proposed to achieve its effects. Trials would benefit from process evaluation alongside, to explore context, mechanisms and effects.

SUPPLEMENTARY MATERIALS

Supplementary materials are available with the online version of this article: 10.1002/14651858.CD016148.

Supplementary material 1 Search strategies

Supplementary material 2 Characteristics of included studies

Supplementary material 3 Characteristics of excluded studies

Supplementary material 4 Characteristics of studies awaiting classification

Supplementary material 5 Characteristics of ongoing studies

Supplementary material 6 Risk of bias

Supplementary material 7 Analyses

Supplementary material 8 Data package

ADDITIONAL INFORMATION

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Relevant analyses data and characteristics of included studies tables were reused from the previous published version of this review [13]. We are grateful to the authors of the previous published version for consenting to the reuse of these data [13].

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Editorial and peer reviewer contributions

The following people conducted the editorial process for this article:

- Sign-off Editor (final editorial decision): Zarko Alfirevic, University of Liverpool, UK;
- Managing Editor (selected peer reviewers, provided editorial guidance to authors, edited the article): Liz Bickerdike, Cochrane Central Editorial Service;
- Editorial Assistant (conducted editorial policy checks, collated peer reviewer comments and supported the editorial team): Addie-Ann Smyth, Cochrane Central Editorial Service;
- Copy Editor (copy editing and production): Jenny Bellorini, Cochrane Central Production Service;
- Peer reviewers (provided comments and recommended an editorial decision): Caroline Homer, Burnet Institute, Australia (clinical/content review), Cherrie Evans, DrPH, CNM Sr Principal Technical Advisor Jhpiego - an affiliate of Johns Hopkins University (clinical/content review), Aditi Bauskar, PhD; Independent Scholar (consumer review), Nuala Livingstone, Cochrane Evidence Production and Methods Directorate (methods review), Jo Platt, Central Editorial Information Specialist (search review).

Contributions of authors

KD, TF and VL screened the search results, performed full-text retrieval and searched the reference lists.

KD and TF performed risk of bias assessments.

KD, TF and VL performed data extraction, data entry and verification.

KD and TF interpreted the data.

KD, TF and VL wrote the review.

TAM and TL input clinically into the review by writing the background and discussion and assessing studies for inclusion.

All authors approved the final version of the review. Kerry Dwan is the guarantor.

Declarations of interest

KD has no known conflicts of interest. KD is a Senior Lecturer at the Liverpool School of Tropical Medicine and based at the Cochrane Infectious Diseases Group (CIDG) editorial base, but not a CIDG staff member. KD was not involved in the editorial process.

TF is a CIDG staff member and has no known conflicts of interest. TF was not involved in the editorial process.

VL is a CIDG Information Specialist and has no known conflicts of interest. VL was not involved in the editorial process.

TAM has no known conflicts of interest.

TL is on a Scientific Research Panel for the Lunaler Group.

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- World Health Organization (WHO), Switzerland

2024/1475460

Registration and protocol

The protocol for this Cochrane review was registered in PROSPERO in April 2024 [67].

Data, code and other materials

As part of the published Cochrane review, the following is made available for download for users of the Cochrane Library: full search strategies for each database (Supplementary material 1); full citations of each unique report for all studies included (Supplementary material 2), excluded at full-text screening (Supplementary material 3), awaiting classification (Supplementary material 4) or ongoing (Supplementary material 5) in the final review; study data, including study information, study arms and study results or test data; consensus risk of bias assessments (OSF | ROB2 final.xlsm); and analysis data, including overall estimates and settings, subgroup estimates and individual data rows (Supplementary material 7). Appropriate permissions have been obtained for such use. Analyses and data management were conducted within Cochrane's authoring tool, RevMan, using the inbuilt computation methods [27]. Template data extraction forms from Covidence and Excel are available from the authors on request. The data package is available (Supplementary material 8).

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ADDITIONAL TABLES

Table 1. Overview of included studies and synthesis table illustrating key study characteristics, ordering studies based on intervention type

Study name (year) country	Study design	Intervention details	Population (sample size: intervention/control)	Outcomes with available data relevant to the review (synthesis method)
Comparison: hands off (poised) versus hands on				
Califano 2022 Italy	RCT	Intervention: hands off - no touching of head or perineum during second stage of labour; spontaneous delivery of shoulder Control: hands on - one hand on fetal head and one hand on perineum	Nulliparous women with singleton pregnancies and vertex presentation (70: 35 intervention, 35 control)	• Second-degree tears (MA) • Third-degree tears (MA) • Fourth-degree tears (MA) • Maternal death (MA)
McCandlish 1998 UK	RCT	Intervention: hands poised - no touching of head or perineum but poised in case of rapid expulsion Control: hands on - pressure on fetal head, guarding of perineum and lateral flexion for delivery of shoulders	Women with a singleton pregnancy with cephalic presentation (5471: 2740 intervention, 2731 control)	• Second-degree (MA) tears • Third- or fourth-degree tears (MA) • PPH > 500 mL (MA) • Perineal pain (MA) • Breastfeeding (MA)
Comparison: warm compress versus control				
Albers 2005 USA	RCT	Intervention: warm compress held continuously to perineum and external genitalia between pushes Control: no touch of perineum	Women aged 18 years and older with a singleton vertex presentation (808: 404 intervention, 404 control)	• Second-degree tears (MA) • Third-degree tears (MA) • Fourth-degree tears (MA) • PPH > 500 mL (narrative, number of events combined between groups)
Terre-Rull 2014 Spain	RCT	Intervention: application of moist or dry heat to perineum during birth with usual care Control: no application of heat, usual care	Pregnant women (198: 132 intervention, 66 control)	• Second-degree tears (MA) • Third-degree tears (MA) • Fourth-degree tears (MA)
Dahlen 2007 Australia	RCT	Intervention: warm pack on perineum and soaked warm pad placed on perineum during contractions Control: usual care with no warm pack applied	Nulliparous women at least 36 weeks pregnant with singleton pregnancy and a cephalic presentation (717: 360 intervention, 357 control)	• Third- or fourth-degree (MA) tears • Perineal pain (MA) • Maternal satisfaction (narrative from questionnaire)
Comparison: massage versus control (hands off or care as usual)				

Table 1. Overview of included studies and synthesis table illustrating key study characteristics, ordering studies based on intervention type *(Continued)*

Albers 2005 USA	RCT	Intervention: perineal massage with lubricant during and between pushes Control: no touch of perineum	Women aged 18 years and older with a singleton vertex presentation (807: 403 intervention, 404 control)	• Second-degree tears (MA) • Third-degree tears (MA) • Fourth-degree tears (MA) • PPH > 500 mL (narrative, number of events combined between groups)
Attarha 2009 Iran	RCT	Intervention: perineal massage Control: routine care	Nulliparous women with singleton, cephalic presentation (202: 102 intervention, 102 control)	• Second-degree tears (MA) • Third-degree tears (MA) • Fourth-degree tears (MA)
Stamp 2001 Australia	RCT	Intervention: massage and stretching of perineum with each contraction Control: usual care with no massage	Women with singleton pregnancy (1340: 708 intervention, 632 control)	• Second-degree tears (MA) • Third-degree tears (MA) • Fourth-degree tears (MA)
Geranmayeh 2012 Iran	RCT	Intervention: sweeping and rotating perineal massage with Vaseline during uterine contractions Control: routine labour care	Women aged 18 to 30 years with anterior cephalic presentation (90: 45 intervention, 45 control)	• Second-degree tears (MA) • Side effects (narrative)
Comparison: Ritgen's manoeuvre versus standard care				
Jönsson 2008 Sweden	RCT	Intervention: Ritgen's manoeuvre - lifting fetal chin interiorly and extending the fetal neck Control: standard care with one hand against perineum	Primiparous women with singleton pregnancies and fetus in cephalic position (1423: 696 intervention, 727 control)	• Third-degree tears (MA) • Fourth-degree tears (MA)
Comparison: primary delivery of posterior versus anterior shoulder				
Aabakke 2016 Denmark	RCT	Intervention: primary delivery of posterior shoulder Control: primary delivery of anterior shoulder	Nulliparous women and women with a previous caesarean birth having their first vaginal birth (750: 325 intervention, 325 control)	• Third- or fourth-degree tears (MA)
Comparison: enriched oil versus liquid wax				
Harlev 2013 Israel	RCT	Intervention: use of liquid wax during second stage of labour Control: use of purified formula of almond oil with olive oil, rich	Women with singleton pregnancies at term (164: 82 intervention, 82 control)	• Second-degree tears (MA) • Third-degree tears (MA)

Table 1. Overview of included studies and synthesis table illustrating key study characteristics, ordering studies based on intervention type *(Continued)*

		with vitamin B1, B2, B6, E and fatty acid, during second stage of labour		
Comparison: combined warm compresses and massage versus control				
Goh 2021 Malaysia	RCT	Intervention: massage and warm compress Control: hands off	Nulliparous women aged 18 years or older with singleton fetus with cephalic presentation (156: 79 intervention, 77 control)	• Second-degree tears (MA) • Third-degree tears (MA) • Maternal satisfaction (MA) • PPH > 500 mL (MA)
Comparison: vocalisation versus control				
Neta 2022 Brazil	RCT	Intervention: vocalisation to maintain an open glottis during pushing and emit sounds when exhaling Control: usual care	Women in active labour with cervical dilation up to 8 cm and fetus in cephalic presentation (40: 20 intervention, 20 control)	• Second-degree tears (MA) • Third-degree tears (MA) • Fourth-degree tears (MA) • Maternal satisfaction (dichotomous, MA) • Perineal pain (MA)
Comparison: combined warm compresses and massage versus massage alone				
Hong 2022 Malaysia	RCT	Intervention: massage during contractions/ pushes with lubricant plus warm compress between contractions/pushes Control: massage during contractions/pushes with lubricant	Nulliparous women aged > 18 years with singleton pregnancy in cephalic presentation (277: 140 intervention, 137 control)	• Second-degree tears (MA) • Third- or fourth-degree tears (MA) • PPH > 500 mL (MA) • Maternal satisfaction (narrative, measured with visual numerical scale) • Side effects (MA)
Comparison: petroleum jelly versus control				
Araujo 2008 Brazil	RCT	Intervention: application of petroleum jelly to perineum and external genitalia from time to time Control: no massage or jelly	Women aged more than 14 years old with no previous vaginal births and singleton, cephalic fetus (106: 53 intervention, 50 control)	• Second-degree tears (MA)
Comparison: perineal protection device versus control				
André 2024 Sweden	RCT	Intervention: perineal protection device inserted between perineum and fetal head with or without lubricant Control: usual care including manual perineal support, slow delivery	Primiparous women with cephalic presentation aged ≥ 18 years (92: 43 intervention, 49 control)	• Second-degree tears (MA) • Third- and fourth-degree tears (MA)

Table 1. Overview of included studies and synthesis table illustrating key study characteristics, ordering studies based on intervention type *(Continued)*

		of the fetal head and use of warm compresses		
Lavesson 2014 Sweden	RCT	Intervention: perineal protection device inserted between perineum and fetal head Control: usual care including perineal support with the fingers or the palm of the hand	Women with cephalic presentation aged ≥ 18 years (1098: 546 intervention, 552 control)	• First- and second-degree tears (MA) • Third-degree tears (MA) • Fourth-degree tears (MA) • Side effects (MA)

Abbreviations: ED: effect direction; MA: meta-analysis of standardised effect sizes; range: effect range; RCT: randomised controlled trial.

INDEX TERMS

Medical Subject Headings (MeSH)

Bias; Delivery, Obstetric [adverse effects] [methods]; Episiotomy [adverse effects] [methods]; *Labor Stage, Second; Lacerations [prevention & control]; Obstetric Labor Complications [prevention & control]; *Perineum [injuries]; *Postpartum Hemorrhage [prevention & control]; *Randomized Controlled Trials as Topic

MeSH check words

Female; Humans; Pregnancy