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[Intervention Review]

Therapeutic ultrasound for postpartum perineal pain and dyspareunia

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ABSTRACT

Background

Proponents of therapeutic ultrasound suggest it can decrease pain by resolution of inflammation processes and reducing the pressure on pain sensitive structures by haematoma and oedema.

Objectives

The objective of this review was to assess the effects of therapeutic ultrasound for treating acute perineal pain, persistent perineal pain or dyspareunia, or both, following childbirth.

Search methods

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (January 2008).

Selection criteria

Randomised and quasi-randomised trials comparing active therapeutic ultrasound with no treatment, placebo ultrasound, or any other 'standard' or active treatment for women with acute or persistent perineal pain or dyspareunia, or both, following childbirth.

Data collection and analysis

One review author assessed trial quality and extracted data.

Main results

Four trials involving 659 women were included. The trials were of variable quality.

Based on two placebo controlled trials, women treated with active ultrasound for acute perineal pain were more likely to report improvement in pain with treatment (odds ratio (OR) 0.37, 95% confidence interval (CI) 0.19 to 0.69). No other outcome reached significance. In one trial comparing pulsed electromagnetic energy with ultrasound for acute perineal pain, women treated with ultrasound were more likely to have bruising post-treatment (OR 1.64, 95% CI 1.04 to 2.60). However, those treated with ultrasound were less likely to have experienced perineal pain within the last 24 hours at 10 days (OR 0.56, 95% CI 0.34 to 0.92) and pain within the last week at three months (OR 0.43, 95% CI 0.22 to 0.84). No other outcome reached significance. Based on one trial, women treated with ultrasound for persistent perineal pain or dyspareunia, or both, were less likely to report pain with sexual intercourse compared with the placebo group (OR 0.31, 95% CI 0.11 to 0.84). None of the other outcomes measured reached significance.

Authors' conclusions

There is not enough evidence to evaluate the use of ultrasound in treating perineal pain or dyspareunia, or both, following childbirth.

Therapeutic ultrasound for postpartum perineal pain and dyspareunia (Review)

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PLAIN LANGUAGE SUMMARY

Therapeutic ultrasound for postpartum perineal pain and dyspareunia

Too little evidence from trials to show whether women have less pain if they have ultrasound treatment for perineal pain after childbirth.

A woman's perineum (area between the vagina and anus) may bruise, tear or be artificially cut (episiotomy) during childbirth. This may cause perineal pain or pain during sexual intercourse (dyspareunia), sometimes lasting more than a year. Ultrasound treatment involves using a probe to apply sound waves onto the woman's perineal area. The review of trials found too little evidence to show whether women have less perineal pain or dyspareunia if they have ultrasound treatment for pain. There is some evidence from studies that it may be beneficial, but further research is needed.

BACKGROUND

Ultrasound refers to sound waves (above 16 to 18 kHz) that are not audible to the human ear. It can be used for both diagnostic and therapeutic purposes. Therapeutic ultrasound using frequencies up to 3 MHz are used clinically to promote healing. 'In vivo' and 'in vitro' studies of the early application of therapeutic ultrasound following soft tissue injury and fracture demonstrate some evidence of benefit in the rate of wound and bone healing, and the quality of repair (for example, improved mechanical properties of scar tissue and callus). Thus, therapeutic ultrasound is widely used by physiotherapists to promote healing following acute musculoskeletal injury.

Spontaneous and/or iatrogenic perineal trauma (for example, episiotomy) are common sequelae of childbirth. In developed countries as few as 4% to 15% of primiparae may have an intact perineum following delivery (Abraham 1990; Bansal 1996; Klein 1994; Thrane 1990). In consequence, it is not surprising many women report perineal pain after childbirth. A survey of 2000 postnatal women by the National Childbirth Trust in the United Kingdom found that perineal pain and discomfort following delivery were a distressing problem for mothers and may significantly affect their function and experience of early motherhood (Greenshields 1993).

Perineal pain is commonly treated with oral analgesia but the use of a variety of local or 'topical' applications, such as therapeutic ultrasound, is also widespread (Sleep 1988). Although the treatment of pain is not a primary indication for the use of therapeutic ultrasound, proponents suggest that pain is decreased as the resolution of the inflammatory process is accelerated, and compression of pain sensitive structures by haematoma and oedema is reduced. The first known trial report of therapeutic ultrasound for the relief of acute perineal pain following childbirth was published in 1980 (Foulkes 1980a).

Women may also experience persistent perineal pain or dyspareunia, or both, following childbirth. Glazener (Glazener 1995) reported 10% of women experienced persistent perineal pain (more than two months) after delivery, increasing to 30% after assisted vaginal delivery. In longer-term follow up there appeared to be a strong association between persistent perineal pain and problems with sexual intercourse (Glazener 1997). Studies of postnatal morbidity suggest a small but significant proportion of women continue to experience persistent perineal pain and dyspareunia more than a year after childbirth (Abraham 1990; Glazener 1997; Hay-Smith 1993; Robson 1981). The possible benefits of ultrasound on acute injury seem to have been extrapolated to include long-standing conditions, as ultrasound has also been widely used to treat chronic musculoskeletal dysfunctions and pain (Feine 1997). The first known report of therapeutic ultrasound used to treat persistent perineal pain was published in 1979 (Fieldhouse 1979).

Physiotherapists are aware that further evidence to support the use of ultrasound in clinical practice is required (Pope 1995) and the effects of therapeutic ultrasound on inflammation are considered a high priority for research by experienced and newly-qualified physiotherapists alike (Walker 1994). Despite some uncertainty about the most appropriate use of ultrasound, surveys show that ultrasound has been, and continues to be, used widely (CEHD 1980; Lindsay 1990; Pope 1995; Robinson 1988; Ter Haar 1988).

The aim of this review is to examine the existing evidence, from randomised clinical trials, for the treatment of acute and/or persistent postpartum perineal pain, and dyspareunia, with therapeutic ultrasound.

OBJECTIVES

The objectives of this review are to determine whether therapeutic ultrasound is a safe and effective treatment for:

1. acute perineal pain following childbirth;
2. persistent perineal pain or dyspareunia, or both, following childbirth.

METHODS

Criteria for considering studies for this review

Types of studies

Trials were considered for inclusion where:

1. there was random or quasi-random allocation to intervention group;
2. a full published report of the trial is available, or in the case of abstracts or unpublished trials a full report is available from the trialist(s).

Both explanatory (therapeutic ultrasound compared with placebo ultrasound or no treatment) and pragmatic trials (therapeutic ultrasound compared with a 'standard' or other active intervention) were considered for inclusion.

Types of participants

Women following childbirth receiving treatment for:

1. acute perineal pain (women presenting within six weeks of the index delivery);
2. persistent perineal pain or dyspareunia, or both (women presenting more than six weeks after the index delivery).

Types of interventions

Trials comparing 'active' therapeutic ultrasound (using any combination of treatment parameters) with:

1. no treatment;
2. inactive therapeutic ultrasound (placebo);
3. any 'standard' or other active intervention.

Types of outcome measures

The main outcome measure of interest was maternal function (for example, self care, infant care, sitting, stair climbing, sexual function etc).

Secondary outcomes of interest were:

1. change in severity of pain or dyspareunia;
2. persistence of pain or dyspareunia;
3. change in amount of bruising and oedema;
4. complications of wound healing (for example, infection, dehiscence).

Search methods for identification of studies

Electronic searches

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register by contacting the Trials Search Co-ordinator (January 2008).

The Cochrane Pregnancy and Childbirth Group's Trials Register is maintained by the Trials Search Co-ordinator and contains trials identified from:

1. quarterly searches of the Cochrane Central Register of Controlled Trials (CENTRAL);
2. monthly searches of MEDLINE;
3. handsearches of 30 journals and the proceedings of major conferences;
4. weekly current awareness search of a further 37 journals.

Details of the search strategies for CENTRAL and MEDLINE, the list of handsearched journals and conference proceedings, and the list of journals reviewed via the current awareness service can be found in the 'Search strategies for identification of studies' section within the editorial information about the Cochrane Pregnancy and Childbirth Group.

Trials identified through the searching activities described above are given a code (or codes) depending on the topic. The codes are linked to review topics. The Trials Search Co-ordinator searches the register for each review using these codes rather than keywords.

We did not apply any language restrictions

Data collection and analysis

Trials were assessed and selected for inclusion, and assessed for quality by Jean Hay-Smith.

Assessment of quality considered method of randomisation (allocation concealment), and blinding (participants, providers and assessors). Randomisation and blinding were judged to be adequate, inadequate or unclear for each included trial.

Trials under consideration were evaluated for methodological quality and appropriateness for inclusion, without consideration of their results. Included trial data were processed as described in [Clarke 2000](#).

RESULTS

Description of studies

Four trials involving 659 women were included. The trials were of variable quality. See table of 'Characteristics of included studies'.

No studies comparing ultrasound with no treatment were found. Two studies compared ultrasound with placebo for the treatment of acute perineal pain ([Creates 1987](#); [Grant 1989](#)), and one included study compared ultrasound with placebo for persistent perineal pain and dyspareunia ([Everett 1992](#)). Two included studies compared ultrasound with pulsed electromagnetic energy for the relief of acute perineal pain ([Bewley 1985](#); [Grant 1989](#)).

Readers should note that pulsed electromagnetic energy (PEME) may also be referred to as pulsed shortwave diathermy or by the

manufacturers machine name (for example, Megapulse, Diapulse, PEME).

Risk of bias in included studies

Four studies met the inclusion criteria, and were assessed for quality on method of randomisation and blinding.

Randomisation

Grant ([Grant 1989](#)) and Everett ([Everett 1992](#)) explicitly reported their methods of randomisation using numbered sealed opaque envelopes and numbered sealed envelopes respectively. Creates ([Creates 1987](#)) used a computer-generated randomised list of numbers but did not state whether this list was 'open' to providers. Bewley ([Bewley 1985](#)) used an independent person to pick treatment allocation out of a hat. Grant ([Grant 1989](#)) and Everett ([Everett 1992](#)) were judged to have adequate concealment of allocation, in Creates ([Creates 1987](#)) allocation concealment is unclear, and in Bewley ([Bewley 1985](#)) it was inadequate.

Blinding

In Bewley ([Bewley 1985](#)) neither participant, provider or assessor seems to have been blind to treatment allocation. Creates ([Creates 1987](#)) blinded both participants and providers using a machine that had been altered with the code known only to manufacturer and technician responsible for servicing the equipment. The blinding of the assessor is unclear. Both Grant ([Grant 1989](#)) and Everett ([Everett 1992](#)) blinded participants, providers and assessors to treatment allocation.

In summary the trial by Grant ([Grant 1989](#)) appears to be at low risk of bias, the trials by Everett ([Everett 1992](#)) and Creates ([Creates 1987](#)) have a moderate risk of bias, and the trial by Bewley ([Bewley 1985](#)) is at high risk of bias.

Effects of interventions

There are no known randomised controlled trials available comparing therapeutic ultrasound with no treatment for acute or persistent perineal pain or dyspareunia.

None of the included studies directly assessed the safety of therapeutic ultrasound, and none reported whether there were any adverse effects of treatment.

Ultrasound versus placebo for acute perineal pain

Participants receiving active ultrasound were more likely to report improvement with treatment (odds ratio (OR) 0.37, 95% confidence interval (CI) 0.19 to 0.69). No other outcome reached significance.

Ultrasound versus pulsed electromagnetic energy for acute perineal pain

Participants receiving ultrasound were more likely to have bruising post-treatment compared with those receiving pulsed electromagnetic energy (OR 1.64, 95% CI 1.04 to 2.60); however, those treated with ultrasound were less likely to have experienced perineal pain within the last 24 hours at ten days (OR 0.56, 95% CI 0.34 to 0.92) and pain within the last week at three months (OR 0.43, 95% CI 0.22 to 0.84). No other outcome reached significance.

Ultrasound versus placebo for persistent perineal pain and dyspareunia

Women treated with ultrasound were less likely to report pain with sexual intercourse compared with the placebo group. However, it should be noted more of the ultrasound group had not attempted or achieved intercourse (OR 0.31, 95% CI 0.11 to 0.84). None of the other outcomes measured reached significance.

DISCUSSION

Participants with acute perineal pain receiving active ultrasound were more likely to report improvement in pain with treatment than those receiving placebo treatment. Those women receiving ultrasound were more likely to have bruising at ten days compared with those receiving pulsed electromagnetic energy, however those treated with ultrasound were less likely to have experienced perineal pain at ten days and three months. The trials included in this review suggest that there is no benefit or only limited benefit of active over placebo ultrasound, or ultrasound over pulsed electromagnetic energy. However, at present there is insufficient evidence to make any real conclusions about the benefits or harms of ultrasound for the relief of perineal pain or dyspareunia, or both.

This view is supported by other authors ([Chapman 1991](#); [Feine 1997](#); [Gam 1995](#); [Schlapbach 1991](#)) who have noted the lack of high-quality randomised controlled trials investigating ultrasound that are necessary to make judgements about the efficacy of this modality in the treatment of acute or chronic pain in a variety of musculoskeletal conditions.

AUTHORS' CONCLUSIONS

Implications for practice

There is insufficient evidence to make any definite conclusion about the benefits, or otherwise, of therapeutic ultrasound for the treatment of acute or persistent perineal pain and dyspareunia.

Where therapeutic ultrasound is currently in use for the treatment of either acute or persistent perineal pain there is insufficient evidence to suggest that the practice be discontinued, but the use of this modality should not be further instituted until further evidence of its efficacy is forthcoming.

Implications for research

Promising findings from 'in vivo' and 'in vitro' studies on the effects of therapeutic ultrasound applied in the inflammatory, proliferative and remodelling phases of wound repair suggest there is potential benefit (acceleration of healing, improved cosmetic appearance and mechanical properties of the scar tissue) in treating acute wounds with this modality. More rapid resolution of oedema etc may result in decreased pain but there is no evidence ultrasound acts directly on pain mechanisms.

In view of the potential benefit of ultrasound in wound healing it seems that further large, high quality, randomised controlled trials are warranted although a more appropriate focus of research would be to investigate the effect of ultrasound on rate and quality of wound healing rather than on perineal pain.

If further studies are planned the inclusion of a no-treatment group is indicated to investigate the extent of the placebo effect created by extra attention from a healthcare professional. In addition, further trials need to examine the effect of different ultrasound treatment parameters (frequency, intensity, duration, pulse intervals etc) and longer periods of follow up are suggested.

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CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Bewley 1985

Methods	Single centre, Bristol, England. Random allocation to treatment group by independent person picking A or B from a hat.
Participants	n = 20 (TG1 = 10, TG2 = 10). Primigravid. Requiring treatment for perineal trauma.
Interventions	TG1 = therapeutic ultrasound. TG2 = megapulse (EMS). Dosage for TG1 & 2 selected by therapist, treatment until symptom free or discharge home.
Outcomes	Hamilton pain scale. Use of oral analgesics.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	High risk	C - Inadequate

Creates 1987

Methods	Single centre, Nottingham, England. Allocation to treatment group by computer-generated list of random numbers (odd numbers received treatment X and even numbers treatment Z).
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Creates 1987 (Continued)

Modified machine to show X (functioning) and Z (non-functioning) with code known only to manufacturer and technician servicing and calibrating equipment.

Participants	n = 76 (TG = 39, PG = 37). Women following childbirth (4-84 hours postdelivery). Mixed parity. Average age 27 (18-38 years).
Interventions	TG = active ultrasound (EMS Therasonic 1030), pulsed, in contact, KY jelly contact medium, therapist free to set frequency, intensity, timing. PG = placebo.
Outcomes	Perineal pain (6 point categorical pain scale). Treatment helped or did not help. Subjective report of effectiveness of treatment. Use of oral analgesics.

Notes

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

Everett 1992

Methods	Multicentre, Milton Keynes and Reading, England. Treatment allocation by numbered, sealed envelope. Machine altered to 12 number dial (6 active, 6 placebo). Retrospective power calculation. Intention-to-treat analysis.
Participants	n = 69 (TG = 37, PG = 32). Women complaining of dyspareunia or vaginal/perineal soreness of at least 2 months duration. No gynaecological surgery since index delivery, no vaginal or urinary infection, not pregnant. Age TG = 27.7 years (4.6), PG = 26.5 years (3.8). Primiparity TG = 31, PG = 26. Median time (weeks) since index delivery TG = 16, PG = 22.5. Previous ultrasound treatment TG = 20, PG = 10. Sexual intercourse not achieved since delivery TG = 17, PG = 8.
Interventions	TG1= ultrasound 3 MHz, 0.5 watts per cm ² , pulse interval 1:1 with average power of 0.2 watts per cm ² , 1 cm diameter transducer with radiating area of 0.78 cm ² , KY jelly contact medium plus cling film, treatment time up to 5 minutes, treatment 3 x a week for 8 treatments. PG = placebo ultrasound.
Outcomes	Perineal pain (4 point categorical scale). Pain during intercourse (4 point categorical scale). Intercourse achieved. Soreness when standing, when wearing jeans. Use of tampons.

Notes

Risk of bias

Therapeutic ultrasound for postpartum perineal pain and dyspareunia (Review)

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Everett 1992 (Continued)

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate

Grant 1989

Methods	Single centre, Reading, England. Treatment allocation by numbered, sealed, opaque envelopes. Machines altered by manufacturer to 12 number dial (8 active and 4 placebo settings) with code known only to manufacturer. Therapist, participant blind to active/placebo allocation. Assessor blind to treatment and active/placebo allocation. Power calculation. Intention-to-treat analysis.
Participants	n = 414 (TG1 = 135, TG2 = 140, PG = 139). Women following operative vaginal delivery, or those with extensive trauma to rectal mucosa or anal mucosa/sphincter, or those who developed severe perineal bruising/haematoma/oedema within 24 hours of delivery. Age TG1 = 27.3 years (4.2), TG2 = 26.9 years (4.5), PG = 27.1 years (5.3). Primigravida TG1 = 103, TG2 = 99, PG = 92. Instrumental or breech delivery TG1 = 91, TG2 = 90, PG = 103. 1st or 2nd degree tear or episiotomy TG1 = 125, TG2 = 132, PG = 130. 3rd or 4th degree perineal trauma TG1 = 6, TG2 = 6, PG = 5. Bruising at trial entry TG1 = 68, TG2 = 82, PG = 74. Oedema at trial entry TG1 = 45, TG2 = 52, PG = 42.
Interventions	TG1 = megapulse (EMS) 27 MHz, PRR 100 pulses per sec, pulse width 65 µsec, 'normal' pulse ratio, 10 minute treatment duration. 1st treatment within 12-24 hours postdelivery, with maximum 3 treatments in 36 hours. TG2 = ultrasound (EMS Therasonic 1030) 3 MHz, 0.5 watts per cm ² , pulse interval 1:4, treatment time 2 min per head size, EMS ultrasound couplant. PG = either placebo ultrasound or placebo megapulse.
Outcomes	Perineal pain (10 cm VAS, and 4 point categorical scale). Midwife assessment of oedema, bruising, haemorrhoids. Midwife and mother assessment of healing. Time of resumption to sexual intercourse. Frequency of pain free intercourse. Maternal wellbeing.
Notes	Follow up at 10 days and 3 months. Data for placebo ultrasound and placebo PEME combined and not reported separately.

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate

EMS: Electro-Medical Supplies

PEME: pulsed electromagnetic energy

PG: placebo group

PRR: pulse repeat rate

TG: treatment group

VAS: visual analogue score

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Foulkes 1980	Controlled clinical trial (case match), without random allocation to therapy, placebo and no treatment groups.
McClaren 1984	Abstract, no useable data. No contact with author.

DATA AND ANALYSES

Comparison 1. Ultrasound versus placebo for acute perineal pain

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 No improvement (self-report) post-treatment	2	339	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.37 [0.19, 0.69]
2 Pain post-treatment	1	279	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.01 [0.49, 2.06]
3 Change in pain score post-treatment	1	279	Mean Difference (IV, Fixed, 95% CI)	-4.20 [-9.63, 1.23]
4 Pain within last 24 hours at 10 days	1	265	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.88 [0.54, 1.45]
5 Pain within last week at 3 months	1	251	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.58 [0.28, 1.19]
6 Bruising post-treatment	1	279	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.31 [0.82, 2.10]
7 Change in bruise size post-treatment	1	279	Mean Difference (IV, Fixed, 95% CI)	2.5 [0.28, 4.72]
8 Bruising at 10 days	1	265	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.73 [0.35, 1.54]
9 Oedema post-treatment	1	279	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.91 [0.51, 1.61]
10 Oedema at 10 days	1	265	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.88 [0.36, 2.14]
11 Haemorrhoids post-treatment	1	279	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.80 [0.44, 1.42]
12 Change in haemorrhoid size post-treatment	1	279	Mean Difference (IV, Fixed, 95% CI)	-0.40 [-2.49, 1.69]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
13 Haemorrhoids at 10 days	1	265	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.05 [0.61, 1.82]
14 Oral analgesia within 24 hours at 10 days	1	265	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.22 [0.68, 2.21]
15 Wound breakdown at 10 days	1	265	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.94 [0.52, 7.32]
16 Dyspareunia at 3 months	1	251	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.18 [0.68, 2.05]
17 No resumption of sexual intercourse at 3 months	1	251	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.41 [0.79, 2.54]

Analysis 1.1. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 1 No improvement (self-report) post-treatment.

Analysis 1.2. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 2 Pain post-treatment.

Analysis 1.3. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 3 Change in pain score post-treatment.

Analysis 1.4. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 4 Pain within last 24 hours at 10 days.

Analysis 1.5. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 5 Pain within last week at 3 months.

Analysis 1.6. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 6 Bruising post-treatment.

Analysis 1.7. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 7 Change in bruise size post-treatment.

Analysis 1.8. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 8 Bruising at 10 days.

Analysis 1.9. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 9 Oedema post-treatment.

Analysis 1.10. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 10 Oedema at 10 days.

Analysis 1.11. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 11 Haemorrhoids post-treatment.

Analysis 1.12. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 12 Change in haemorrhoid size post-treatment.

Analysis 1.13. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 13 Haemorrhoids at 10 days.

Analysis 1.14. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 14 Oral analgesia within 24 hours at 10 days.

Analysis 1.15. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 15 Wound breakdown at 10 days.

Analysis 1.16. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 16 Dyspareunia at 3 months.

Analysis 1.17. Comparison 1 Ultrasound versus placebo for acute perineal pain, Outcome 17 No resumption of sexual intercourse at 3 months.

Comparison 2. Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 No improvement (self-report) post-treatment	1	275	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.87 [0.36, 2.11]
2 Pain post-treatment	2	295	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.10 [0.56, 2.19]
3 Change in pain score post-treatment	1	275	Mean Difference (IV, Fixed, 95% CI)	-3.70 [-8.83, 1.43]
4 Pain within last 24 hours at 10 days	1	275	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.56 [0.34, 0.92]
5 Pain within last week at 3 months	1	255	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.43 [0.22, 0.84]
6 Bruising post-treatment	2	295	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.64 [1.04, 2.60]
7 Change in bruise size post-treatment	1	275	Mean Difference (IV, Fixed, 95% CI)	2.2 [-0.17, 4.57]
8 Bruising at 10 days	1	263	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.57 [0.28, 1.16]
9 Oedema post-treatment	2	295	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.13 [0.65, 1.97]
10 Oedema at 10 days	1	263	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.72 [0.31, 1.70]
11 Haemorrhoids post-treatment	2	295	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.85 [0.48, 1.49]
12 Change in haemorrhoid size post-treatment	1	275	Mean Difference (IV, Fixed, 95% CI)	-0.30 [-2.38, 1.78]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
13 Haemorrhoids at 10 days	1	263	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.03 [0.59, 1.78]
14 Oral analgesia post-treatment	1	20	Peto Odds Ratio (Peto, Fixed, 95% CI)	8.26 [0.48, 142.43]
15 Oral analgesia within 24 hours at 10 days	1	263	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.91 [0.52, 1.62]
16 Wound breakdown at 10 days	1	263	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.96 [0.30, 3.05]
17 No resumption of sexual intercourse at 3 months	1	255	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.28 [0.72, 2.27]
18 Dyspareunia at 3 months	1	255	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.31 [0.76, 2.25]

Analysis 2.1. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 1 No improvement (self-report) post-treatment.

Analysis 2.2. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 2 Pain post-treatment.

Analysis 2.3. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 3 Change in pain score post-treatment.

Analysis 2.4. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 4 Pain within last 24 hours at 10 days.

Analysis 2.5. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 5 Pain within last week at 3 months.

Analysis 2.6. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 6 Bruising post-treatment.

Analysis 2.7. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 7 Change in bruise size post-treatment.

Analysis 2.8. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 8 Bruising at 10 days.

Analysis 2.9. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 9 Oedema post-treatment.

Analysis 2.10. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 10 Oedema at 10 days.

Analysis 2.11. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 11 Haemorrhoids post-treatment.

Analysis 2.12. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 12 Change in haemorrhoid size post-treatment.

Analysis 2.13. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 13 Haemorrhoids at 10 days.

Analysis 2.14. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 14 Oral analgesia post-treatment.

Analysis 2.15. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 15 Oral analgesia within 24 hours at 10 days.

Analysis 2.16. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 16 Wound breakdown at 10 days.

Analysis 2.17. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 17 No resumption of sexual intercourse at 3 months.

Analysis 2.18. Comparison 2 Ultrasound versus pulsed electromagnetic energy (PEME) for acute perineal pain, Outcome 18 Dyspareunia at 3 months.

Comparison 3. Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Continuing perineal pain	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.50 [0.18, 1.37]
2 Discomfort with standing	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.83 [0.24, 2.89]
3 Discomfort wearing jeans	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	2.26 [0.78, 6.55]
4 Unable to use tampons	1	54	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.27 [0.43, 3.74]
5 Pain with vaginal penetration	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.59 [0.20, 1.72]
6 Pain with sexual intercourse (dyspareunia)	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.31 [0.11, 0.84]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7 Pain after sexual intercourse	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.61 [0.61, 4.29]
8 Pain day after sexual intercourse	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	2.43 [0.75, 7.88]
9 Bleeding after sexual intercourse	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	2.18 [0.46, 10.40]
10 Sexual intercourse not attempted or not achieved	1	65	Peto Odds Ratio (Peto, Fixed, 95% CI)	4.12 [0.86, 19.61]

Analysis 3.1. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 1 Continuing perineal pain.

Analysis 3.2. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 2 Discomfort with standing.

Analysis 3.3. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 3 Discomfort wearing jeans.

Analysis 3.4. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 4 Unable to use tampons.

Analysis 3.5. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 5 Pain with vaginal penetration.

Analysis 3.6. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 6 Pain with sexual intercourse (dyspareunia).

Analysis 3.7. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 7 Pain after sexual intercourse.

Analysis 3.8. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 8 Pain day after sexual intercourse.

Analysis 3.9. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 9 Bleeding after sexual intercourse.

Analysis 3.10. Comparison 3 Ultrasound versus placebo for persistent perineal pain or dyspareunia, or both, Outcome 10 Sexual intercourse not attempted or not achieved.

WHAT'S NEW

Date	Event	Description
12 August 2009	Amended	Contact details amended

HISTORY

Protocol first published: Issue 4, 1997

Review first published: Issue 3, 1998

Date	Event	Description
22 January 2008	New search has been performed	Search updated. No new trial reports identified. Converted to new review format.
30 April 2006	Amended	Search updated. No new trials identified.
19 May 1998	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

Jean Hay-Smith developed and completed the review.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- University of Otago, Dunedin, New Zealand.

External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Episiotomy [adverse effects]; *Pain Management; *Ultrasonic Therapy; Dyspareunia [etiology] [*therapy]; Obstetric Labor Complications [*therapy]; Pain [etiology]; Perineum [*injuries]

MeSH check words

Female; Humans; Pregnancy