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The Effect of Massage on Acute Postoperative Pain in Critically and Acutely Ill Adults Post-thoracic Surgery: Systematic Review and Meta-analysis of Randomized Controlled Trials

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ABSTRACT

Critical care practice guidelines identify a lack of clear evidence on the effectiveness of massage for pain control. To assess the effect of massage on acute pain in critically and acutely ill adults post-thoracic surgery. Medline, Embase, CINAHL, PsychInfo, Web of Science, Scopus and Cochrane Library databases were searched. Eligible studies were randomized controlled trials (RCTs) evaluating the effect of massage compared to attention control/sham massage or standard care alone on acute pain intensity post-thoracic surgery. Twelve RCTs were included. Of these, nine evaluated massage in addition to standard analgesia, including 2 that compared massage to attention control/sham massage in the intensive care unit (ICU), 6 that compared massage to standard analgesia alone early post-ICU discharge, and 1 that compared massage to both attention control and standard care in the ICU. Patients receiving massage with analgesia reported less pain (0–10 scale) compared to attention control/sham massage (3 RCTs; N = 462; mean difference −0.80, 95% confidence interval [CI] −1.25 to −0.35; $p < 0.001$; $I^2 = 13\%$) and standard care (7 RCTs; N = 1087; mean difference −0.85, 95% CI −1.28 to −0.42; $p < 0.001$; $I^2 = 70\%$). Massage, in addition to pharmacological analgesia, reduces acute post-cardiac surgery pain intensity.

Introduction

Thoracic surgery, which includes cardiac and pulmonary surgeries, is performed more frequently than any other surgery.[1,2] Cardiac surgeries require admission to an intensive care unit (ICU), whereas patients undergoing pulmonary surgery may be admitted to an ICU, postanesthesia care unit, or to a dedicated intermediate care or step down unit.[3] Following discharge, recovery is supported on acute care wards.

Thoracic surgery patients often experience severe acute postoperative pain that can originate from a range of sources, including deep tissue injuries, thoracostomy tubes, costovertebral joint disruption, and fractures of the sternum or ribs.[4–11] Unrelieved postoperative pain can interfere with patients' ability to cough and mobilize effectively, which predisposes them to postoperative complications, such as atelectasis, pneumonia and deep vein thrombosis.[4,6,12] Moreover, uncontrolled acute postoperative pain is a significant predictor of the persistence and severity of long-term pain.[13–16]

Opioids are routinely provided for severe postoperative pain, but the use of complementary non-pharmacologic interventions may reduce the need for opioids and enhance analgesic effects.[17] Massage therapy has been identified by patients and nurses as an acceptable, feasible, and potentially effective method to maximize pain relief in the ICU.[18] In a recent study, researchers found that administering massage in the ICU to patients after undergoing cardiac surgery was feasible and perceived to be an acceptable complementary therapy for pain relief.[19] It has been shown to reduce postoperative pain in several randomized controlled trials (RCTs).[20,21] Current practice guidelines from the Society of Critical

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Care Medicine[17] suggested that massage may be used to improve pain control, but noted that the lack of clear evidence on effectiveness precluded recommending the routine use of massage.

A recent meta-analysis found that massage therapy was effective for treating pain in surgical populations,[21] however it is unclear if massage can have the same beneficial effect in the critical care setting where pain intensity is highest and continues to persist even during unrestricted use of opioids.[6,9,22,23] A 2015 systematic review of massage therapy post-cardiac surgery[20] evaluated six RCTs[24–29] and one non-randomized trial,[30] but did not synthesize results quantitatively and only included comparisons to usual care alone, but not to sham massage or attention control. Additionally, the systematic review did not focus on the effects of massage in critical care and did not include several key studies conducted in this highly acute clinical setting.

Objective

The objective of the present study was to conduct a systematic review and meta-analysis to evaluate the effects of massage therapy on acute postoperative pain among adult thoracic surgery patients in the ICU and early post-ICU discharge compared to usual care or compared to sham massage or attention control.

Methods

Protocol and registration

The protocol for this meta-analysis was registered in PROSPERO (CRD42015026931). The meta-analysis was reported per the Preferred Reporting Items for Systematic Reviews and Meta-Analysis statement.[31]

Eligibility criteria

Included studies were RCTs that assessed the effect of massage on acute postoperative pain among adult inpatients in the ICU or acute care wards post-thoracic surgery, excluding laparoscopic surgery. Eligible interventions included massage administered to any body part within one week of surgery. Eligible comparisons included usual care alone, sham massage that involved the use of touch (e.g., hand holding), or attention controls (e.g., therapeutic presence without the use of touch). Massage could be administered alone or in combination with analgesics or other non-specific interventions (e.g., aromatherapy). To be eligible, patients in the massage and comparator trial arms had to receive similar analgesics protocols. Eligible studies had to report the assessment of pain intensity, measured within 24 h of massage administration, using either a numerical rating scale (e.g., 0–10) or visual analog scale (e.g., 0–100). There were no restrictions based on language, publication status, or year of publication.

Search strategy

Eligible studies were identified by searching MEDLINE, Embase, CINAHL, PsycInfo, Web of Science, Scopus and the Cochrane Central Register of Controlled Trials from inception until October 20, 2015, and updated until April 1st, 2017. The search strategy was developed with the assistance of a research librarian who conducted the search. Key terms included 'thoracic/cardiac surgery', 'massage' and 'pain'. The MEDLINE search strategy is provided in Supplemental Digital Content 1. Search results were uploaded into the systematic review program DistillerSR (Evidence Partners, Ottawa, Canada), and DistillerSR was used to store and track search results and results of the review process.

Additionally, eligible studies were sought by scanning the reference lists of included articles and relevant reviews. Also, in November 2015, we searched the Current Controlled Trials, Clinicaltrials.Gov, the ISRCTN Register, the National Centre for Complementary and Alternative Medicine database, and the WHO International Clinical Trials Registry Platform. The search was further updated on April 1st, 2017. Authors of included trials were contacted to attempt to identify any unpublished trials.

Study selection

Study selection was done independently by two investigators. First, titles and abstracts were screened, and if either reviewer indicated that the trial was potentially eligible, the full text was reviewed independently by both reviewers. Any disagreements at the full-text level were resolved via consensus by consulting a third reviewer.

Data extraction and risk of bias assessment

Data were extracted independently by two investigators using a pre-defined data extraction form in DistillerSR. The data extraction form was pilot-tested on two randomly selected studies and subsequently refined. Data were extracted on patient population, sample size, study setting, type of massage therapy and comparator (including duration, frequency, technique, body area, interventionist), pain assessment tool, pain intensity pre- and post-intervention, and adverse events. If otherwise eligible studies did not report pain intensity data within 24 h of the massage, authors were contacted for these data. Risk of bias was evaluated independently by two reviewers using the Cochrane Risk of Bias Tool.[32] Disagreements were resolved via consensus, including consultation with a third reviewer.

Statistical analysis

Statistical analyses were performed using Review Manager 5.3 software.[33] Effect estimates for all analyses were estimated using DerSimonian-Laird random effects models. Pain intensity effect sizes were calculated using mean pre-post changes and SDs based on the first post-massage assessment. If change scores were not available, we used post-massage means and SDs. If scores were reported on a 0–100 VAS, they were converted to 0–10 scores for the purpose of data analysis. Given the high correlations observed across studies between the VAS and NRS, the VAS scores were converted to NRS ratings.[34] Between-study variability was evaluated with I^2.[32] Subgroup analyses were planned by comparator (standard care versus sham massage or attention control) and to explore other possible reasons for heterogeneity. Possible publication bias was assessed using visual inspection of funnel plot asymmetry. Although not anticipated pre-review, markedly different pain management protocols required that trials of massage done in the context of standard analgesic therapy be evaluated separately from trials of massage applied without these therapies.

Results

Study selection

The database and registry searches and manual searches of reference lists retrieved 194 total citations, including 165 unique citations. Of these, 25 underwent full-text review, and 12 were determined to be eligible and were included. See Fig. 1 and Supplemental Digital Content 2. Excluded Articles post full-text Review. Four of the seven massage studies from a previous