Interventions for hemiplegic shoulder pain: systematic review of randomised controlled trials

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CRD summary
This review assessed the effectiveness of possible interventions for hemiplegic shoulder pain after stroke. The authors concluded that although five interventions were used for managing hemiplegic shoulder pain, their effects were limited. The limited evidence available and limitations in the review process made the overall reliability of the authors’ conclusions unclear.

Authors’ objectives
To assess the effectiveness of possible interventions for hemiplegic shoulder pain, the impact of reducing subluxation and spasticity on shoulder pain and the change in passive shoulder external rotation with change in shoulder pain.

Searching
MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL) and CINAHL were searched for published peer-reviewed articles from inception to June 2008 with no language restrictions. Specific search terms were not reported. Reference lists of relevant studies were reviewed.

Study selection
Randomised controlled trials (RCTs) of any intervention for hemiplegic shoulder pain in stroke patients that reported pain as the outcome measure were eligible for inclusion. Most patients received Botulinum toxin A (BoNT/A) or back massage. Most patients were up to three months post-stroke. Mean age of participants was 59 years. The proportion of males ranged from 36.7% to 75%. Between 44.8% and 69% of patients had a left-sided stroke.

It appeared that two reviewers selected the studies.

Assessment of study quality
The quality of the included trials was assessed using the Physiotherapy Evidence-Based Database (PEDro) scale (10 was the highest achievable score). Scores of more than 5 were considered to have moderate to high quality. Individual quality components and how they were assessed were reported. Studies in which generation of allocation sequence was not adequately followed were excluded.

Two reviewers independently assessed the quality of the included trials.

Data extraction
Incidence of binary events were extracted and odds ratios (OR) with 95% confidence intervals (CIs) were calculated. For continuous outcomes, standardised mean difference (Hedge’s g) with standard deviation (SD) was calculated. Pain improvement was determined using a visual analogue scale. The mean and standard deviation of spasticity outcomes were calculated using the modified Ashworth Scale (range 0 to 5). Outcomes were considered immediate (at end of treatment sessions), short-term (up to two months post-treatment) or long-term (over two months post-treatment). Authors were contacted for missing data. Where necessary, missing values were imputed.

It appeared that two reviewers extracted data.

Methods of synthesis
Odds ratios and standardised mean differences (SMD) were pooled using the inverse variance weight and random-effects models. The incremental effect size of passive external rotation was estimated from reduction of hemiplegic shoulder pain in a linear regression model. Heterogeneity between studies (study location, age of patients and the
injected muscle) was assessed with the $I^2$ statistic. Sensitivity analyses was performed on each item of the PEDro scale and funding source.

**Results of the review**

Eight RCTs (n=343) met the inclusion criteria. Seven RCTs met more than five of the PEDro criteria.

**Immediate effects (three RCTs):** Aromatherapy plus acupuncture showed a significantly better effect than acupuncture alone (OR -1.94, 95% CI -2.79 to -1.09; one RCT). Slow-stroke back massage showed better immediate effect than no massage (OR -2.12, 95% CI -2.6 to -1.63; one RCT). Intramuscular electric stimulation was significantly more effective compared to Hemisling (OR -1.35, 95% CI -2.03 to -0.68; one RCT).

**Short-term effects (five RCTs):** No significant differences were demonstrated between BoNT/A and placebo (three RCTs); heterogeneity between the studies was high ($I^2$=83%). There was no significant difference between BoNT/A and triamcinolone acetonide.

**Long-term effects (five RCTs):** Intramuscular electric stimulation showed significantly better long-term benefits compared with Hemisling (OR 0.79, 95% CI -1.37 to 0.20; one RCT); BoNT/A showed no significant benefits when compared to placebo (three studies) or triamcinolone acetonide (one RCT) or when triamcinolone acetonide was compared to placebo (one RCT).

Overall, there was no significant difference in the incidence of adverse events between interventions and control (OR 1.45, 95% CI 0.29 to 7.38; three RCTs). No relationship was identified between subluxation (one RCT) or spasticity (two RCTs) and hemiplegic shoulder pain. Passive shoulder external rotation increases with decreasing hemiplegic shoulder pain.

Results of sensitivity analyses were reported.

**Authors' conclusions**

Five interventions were used for managing hemiplegic shoulder pain and their effects were limited in the context of trials.

**CRD commentary**

This review addressed a well-defined question with potentially reproducible inclusion criteria. The search included appropriate electronic databases. No attempts were made to retrieve unpublished studies and some relevant data might have been missed. Two reviewers independently assessed the quality of the included trials; it was unclear how many reviewers selected studies and extracted data. Authors were contacted for missing data. Some values were imputed; no details on methods of imputation were reported, which made interpretation of the results problematic. Quality of the included studies was assessed with appropriate criteria; results for each criterion were reported for each study. The impact of study quality on the results was assessed. Where studies were pooled there was evidence of both clinical and statistical heterogeneity. Therefore, the reliability and generalisability of the pooled results was uncertain. Potential sources of heterogeneity were investigated. The wide confidence intervals suggested a large degree of uncertainty around the effect estimates. The characteristics of the individual studies were presented and potential sources of heterogeneity were assessed and reported. Sensitivity analyses did not alter these results.

The limited evidence available and limitations in the review process made the overall reliability of the authors' conclusions unclear.

**Implications of the review for practice and research**

**Practice:** The authors stated that aromatherapy, slow-stroke back massage and intramuscular neuromuscular electric stimulator can be used for hemiplegic shoulder pain and demonstrated immediate effect and intramuscular neuromuscular electric stimulator showed long-term effect; BoNT/A and triamcinolone acetonide were not useful for managing hemiplegic shoulder pain at one or three months.

**Research:** The authors stated that further research should use electromyography as the measure for spasticity as the
modified Ashworth Scale was not a validated measure.

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