A meta-analysis of the efficacy of acupuncture in treating dysphagia in patients with a stroke

Yao-Bin Long, Xiao-Ping Wu

Abstract

Background Dysphagia, or deglutition difficulty, is a common manifestation in patients with a stroke and its management is an important aspect of rehabilitation. Acupuncture, a complementary and alternative therapy, is the subject of growing public interest for treatment of stroke.

Objective A meta-analysis was performed to study the effect of acupuncture for treatment of dysphagia in patients affected by a stroke.

Methods Randomised controlled trials (RCTs) comparing acupuncture treatment with non-acupuncture treatment of dysphagia in patients with a stroke were identified from the databases of PubMed, Embase, Cochrane Library and CBM disc (China Biological Medicine Database). Eligible investigations were included and data on the effectiveness of acupuncture were extracted and synthesised by meta-analysis using RevMan 5.1.4. Results were expressed as OR for dichotomous data; 95% CIs were also calculated.

Results Seventy-two RCTs (3208 patients in the treatment group and 2926 patients in the control group) were identified. Details of randomisation and blinding were not reported and information on withdrawals and dropouts was missing in most of included reports. Meta-analysis showed that the effectiveness of treatment in the group receiving acupuncture was higher than that in the non-acupuncture group (OR=5.17, 95% CI 4.18 to 6.38; p<0.00001). However, the study quality was generally low and of insufficient quality to make recommendations about using acupuncture in the rehabilitation of patients with dysphagia due to stroke.

Conclusions Acupuncture might be beneficial in the rehabilitation of patients with dysphagia caused by stroke, and the evidence justifies future high-quality studies.

INTRODUCTION

Dysphagia (deglutition disorder or swallowing difficulty) is a common problem in the elderly. It has a number of causes, including neurological disorders (such as stroke), benign peptic strictures, oesophageal and gastric malignancy and achalasia. Neurological disorders, most commonly stroke, are the main causes of dysphagia. The incidence of dysphagia in patients with a stroke is 50–60%. Dysphagia is relevant to the prognosis in patients with stroke because it can cause aspiration pneumonia or nutritional deficits, and affects the quality of the life. Treatment for dysphagia remains difficult.

Acupuncture is a complementary therapy that is the subject of growing public interest. It may be beneficial for the treatment and rehabilitation of diseases such as traumatic brain injury, chronic tension-type headache, postoperative nausea and vomiting, chronic pelvic pain syndrome and menopausal symptoms. Acupuncture has been used for many hundreds of years for a wide variety of disorders, and its mechanisms of action are complex. It exerts its effect through local reflexes and through the central nervous system. It is well established that stimulation of the skin and muscles, either electrically or with noxious or non-noxious stimuli, induces a variety of somato-motor and autonomic responses. This strongly suggests that acupuncture acts by exciting cutaneous and/or muscular afferent nerve fibres.

Acupuncture treatment might have an important role in the treatment of dysphagia, but the evidence is weak. We performed a systematic review and meta-analysis to investigate whether acupuncture is effective in the treatment of dysphagia in patients with a stroke.

MATERIALS AND METHODS

Search strategy

Relevant studies were sought using the search engines of PubMed, Embase, Cochrane Library and CBM disc (China Biological Medicine Database) on 1 September 2011. The search term ‘acupuncture AND (dysphagia OR deglutition disorder OR swallow disorder)’ was used for PubMed, Embase, and Cochrane Library. The search term ‘dysphagia’ was entered into the CBM disc and the search was limited to the ‘Title’. We also extended our search spectrum to the ‘related articles’ and bibliographies of all retrieved studies. If multiple publications from the same study group occurred, we included only the most complete paper for analysis.
Inclusion and exclusion criteria

Inclusion criteria
The inclusion criteria for the study were:
1. Study type: randomised controlled trials (RCTs).
2. Subjects included in the study: all patients with a stroke who met the diagnostic criteria of dysphagia.
3. Interventions: in the treatment group, medicine and/or rehabilitation training plus acupuncture were used; in the control group, medicine and/or rehabilitation training only were used.
4. The baseline information was comparable.

Exclusion criteria
The exclusion criteria for the study were:
1. Review articles and editorials.
2. Case reports.
4. The design of the study did not include acupuncture and control groups.
5. Quasi-RCTs and case–control trials.

Outcome measure
The effect of treatment was evaluated according to the criteria as follows14:
1. Recovery: the complete resolution of dysphagia.
3. Improved: partial resolution of dysphagia but swallowing difficulty remains in the sitting position.
4. No improvement: slight change or no change in dysphagia.

The effective rate of improvement in two groups was calculated using the following formula:
\[
\text{effective rate} = \frac{(\text{recovery} + \text{markedly improved} + \text{improved})}{\text{total number}}.
\]

Study inclusion
Decisions about the studies to be included were made by the two authors independently. Titles and abstracts were scanned first to obtain a list of possibly related publications, then full texts were obtained for those articles identified as either relevant or not clear and finally, only RCTs fitting the predefined inclusion criteria were included in the study.

Data extraction
The following information was extracted from each investigation independently by two investigators: first author’s surname, year of publication, the number of cases and controls, outcomes. The results were compared and disagreements were resolved by discussion.

Appraising the quality of published reports
We appraised the study quality by a randomisation method, blinding of the assessor of outcome and full adjustment for withdrawals and dropouts, as originally described by Jadad et al15. We considered studies to be of higher quality if they met two of these criteria—that is, acceptable method of randomisation; blinded assessor; full adjustment for all withdrawals and dropouts. To achieve as full an implementation as possible, authors of the papers were contacted by email or telephone, when possible.

Statistical analysis
Statistical analysis was carried out using Cochrane Review Manager V5.1.4 (RevMan 5.1.4, Cochrane Library, UK). The pooled statistics were calculated using the fixed-effects model, and a random-effects model was used if the p value of the heterogeneity test was <0.1. Results were expressed as OR for dichotomous data and 95% CIs. Heterogeneity between included studies was tested using a \( \chi^2 \) test.

RESULTS

Search result
Searches in the databases resulted in 47 studies from PubMed, 52 from Embase, 24 from Cochrane Library and 670 from CBM disc. After filtering the search results according to the inclusion and exclusion criteria, 72 RCTs2192 remained for inclusion in our meta-analysis. All these RCTs were conducted in China and the results published in Chinese. The 72 RCTs included 3208 cases in the treatment group and 2926 patients in the control group (table 1). Relevant data were extracted and the baseline information in the 72 RCTs was comparable.

Quality of the included studies
Most of the reports included were brief and gave no information about randomisation or participant and assessor blinding, or details of withdrawals and dropouts. Four studies included met our criteria for higher quality. Studies by Han,70 Qu21 and Su and Lai22 were correctly randomised and used a blinded assessor. Xie et al58 was correctly randomised, used a blinded assessor, and made full adjustment for withdrawals and dropouts.

Evaluation of the effective rate for acupuncture
Seventy-two RCTs were included in our meta-analysis of the efficacy of acupuncture in treating dysphagia in patients with a stroke. The p value of the heterogeneity test was 0.0003 and a random-effects model was used. The results had a pooled OR of 5.17 (95% CI 4.18 to 6.53), and a highly significant difference between the acupuncture treatment group and non-acupuncture group was found (p<0.00001) (figure 1).

Subgroup analysis
We also performed an additional, post hoc analysis based on the method of assessment of dysphagia which might affect the conclusion. Of the RCTs included, many use criteria of the water swallowing test. This subgroup analysis included 47 RCTs and again showed a highly significant effect of (OR=5.57, 95% CI
4.21 to 7.38, p < 0.00001; p value of the heterogeneity test 0.0002) (figure 2).

The four higher-quality studies were included in a subgroup analysis, which again demonstrated a statistically significant effect for acupuncture in comparison with no acupuncture (OR=2.34, 95% CI 1.34 to 4.07, p=0.003; p value of the heterogeneity test 0.87).

Several study designs included other interventions for dysphagia in both the acupuncture and no acupuncture groups, such as acupuncture+drugs versus drugs alone, acupuncture+education+drugs versus education+drugs, and acupuncture+education versus education alone, etc. Interestingly, we found that use of acupuncture as an adjunct in the treatment group was effective in the treatment of dysphagia (data not shown).

DISCUSSION

This meta-analysis was performed by systematically searching and including RCTs investigating the role of acupuncture in the treatment of dysphagia in patients with a stroke. We found that acupuncture was beneficial in rehabilitation of patients with dysphagia. It was also effective in a subgroup analysis of trials using the water swallowing test, and a separate subgroup analysis of four higher-quality studies. However, most studies were of low quality, limiting the strength of our conclusion. The evidence justifies future high-quality research to confirm whether or not acupuncture treatment is effective in the treatment of dysphagia in patients with a stroke.

Previous reports have shown that acupuncture is effective in the treatment of oesophageal and other alimentary tract disorders. Zhang et al. carried out a study in patients with gastro-oesophageal reflux and found that the 24 h intra-oesophageal pH and bile reflux, endoscopic grading score and symptom score were all reduced significantly after acupuncture treatment. Wang et al. used

Table 1 The characteristics of the included trials

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Non-WST, included video-fluoroscopic swallowing study test or other measures; WST, water swallowing test.

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DISCUSSION

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electroacupuncture in cats with induced gastric distention and found that acupuncture stimulation significantly inhibited the frequency of transient lower oesophageal sphincter relaxations (TLESR) and the rate of common cavities during TLESR. They also explored the relevant indicators and receptors, and speculated that acupuncture may act on the brain stem, and may be mediated through nitric oxide, cholecystokinin.

Figure 1  Evaluation of the effective rate for acupuncture.
octapeptide-A receptor and μ opioid receptors. Shi et al\textsuperscript{97} found that acupuncture reduced nausea and vomiting after surgery and chemotherapy. Schneider et al\textsuperscript{98} performed a systematic review of acupuncture treatment in gastrointestinal diseases and showed that acupuncture could be effective for inflammatory bowel diseases.

These studies suggest that acupuncture may regulate disorders of the alimentary tract, possibly through its effect on the peripheral nervous system. To consider whether acupuncture can affect conditions of the central nervous system such as stroke, and thus influence disorders of the alimentary tract, we reviewed the following reports: Zhou et al\textsuperscript{99} conducted a study on rats subjected to middle cerebral artery occlusion with continuous monitoring of cerebral blood flow, and showed that acupuncture treatment protected the brain from cerebral ischaemia by increasing blood flow to the ischaemic brain region via neural regulation. Zhang et al\textsuperscript{100} reported that acupuncture could alleviate cerebral oedema in rats with stroke following ischaemia. Du et al\textsuperscript{101} reported that pretreatment with acupuncture protected against transient cerebral ischaemia, and their observation also suggested that the ERK1/2 pathway might be involved in acupuncture pretreatment-induced cerebral ischaemic tolerance via the cannabinoid receptor in rats. Choi et al\textsuperscript{102} performed a study in a global ischaemic rat model and suggested that acupuncture stimulation was responsible for the potential protection of neurons through suppression of the cerebral blood flow response which increased plasma osmolality and extracellular glutamate in diabetic rats under ischaemic conditions.

Interestingly, Xie et al\textsuperscript{14} performed a systematic review of acupuncture for dysphagia in patients with a stroke, limited to studies in acute stroke, and only found one report for inclusion.\textsuperscript{70} Our meta-analysis was not limited to studies in acute stroke, and found a much larger sample.

Limitations
The quality of reporting in the studies included was poor. Many did not report detailed methods, which prevented...
us from reaching a robust conclusion with our meta-analysis. Another limiting factor was the small sample size in some studies.

CONCLUSION

Acupuncture may be beneficial in rehabilitation of patients with a stroke affected by dysphagia. Further high-quality studies in this area are justified.

Summary points

- We reviewed the Chinese literature on acupuncture for dysphagia in stroke patients.
- The studies are strongly positive but poor quality.

Contributors

Y-BL and X-PW: conceived and designed the experiments. Y-BL and X-PW: analyzed the data. Y-BL wrote the paper.

Competing interests

None.

Provenance and peer review

Not commissioned; externally peer reviewed.

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