Treatment of upper extremity spasticity in stroke patients by focal neuronal or neuromuscular blockade: a systematic review of the literature
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Authors' objectives
The purpose of the review was to review the treatment of upper extremity spasticity in stroke patients by focal neuronal or neuromuscular blockade.

Searching
MEDLINE (from 1966 to October 2000), Current Contents (from 1996 to October 2000), CINAHL (from 1982 to October 2000) and the Cochrane Library (date of access not reported) were searched. The search terms were reported in the paper. In addition, the authors checked the references of retrieved articles. Only papers published in English, German, French or Dutch were eligible.

Study selection
Study designs of evaluations included in the review
Inclusion criteria relating to the study design were not reported. Studies with fewer than 10 patients were excluded.

Specific interventions included in the review
Studies that investigated treatment with focal neuronal and neuromuscular blocking agents were eligible. The interventions investigated in the included studies were botulinium toxin type A (BTX-A), alcohol neurolysis and phenol neuromuscular blockade.

Participants included in the review
Studies that included adult stroke patients with upper extremity spasticity were eligible.

Outcomes assessed in the review
Inclusion criteria relating to the outcomes were not reported.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Study quality was assessed using criteria adapted from those developed by Chalmers et al. (see Other Publications of Related Interest). Each of the 13 criterion were scored as sufficient, moderate or insufficient. The criterion addressed the internal validity of the included studies, as well as the quality of the reporting. The authors set the following minimal criteria for validity: no negative scores on the internal validity items; at least half of the items scored positive. Three reviewers independently assessed all the studies and resolved any disagreements by consensus.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were discussed in a narrative synthesis.

How were differences between studies investigated?
The studies were grouped according to study design and the intervention under study.

**Results of the review**

Twelve studies were eligible for inclusion. Four were randomised controlled trials (RCTs), while eight used an observational design.

Two studies met the minimal criteria for validity.

Three RCTs studied the efficacy of different doses of BTX-A. Treatment with BTX-A resulted in tone reduction and improvements in passive range of motion (PROM) in comparison with placebo. However, a clear improvement in functional abilities was not demonstrated in any of the included studies. The findings of the observational studies that investigated BTX-A supported those of the RCTs.

One RCT investigated the efficacy of combining BTX-A with electrical stimulation (ES). The study found evidence of a synergistic effect of the combined treatment. In particular, treatment with BTX-A and ES seemed superior with regard to hand hygiene and spasticity reduction.

A clear dose-response relationship was not demonstrated in any of the RCTs, but the authors noted that there was a tendency for a dose-related improvement in the Ashworth score and PROM.

Only minor side-effects were reported in the included studies. These included transient skin rash, soreness and pain at the injection site.

Two observational studies (neither of which included a control group) investigated the effectiveness of alcohol neurolysis and phenol neuromuscular blockade, respectively. Significant improvements in tone and PROM were found in patients treated with alcohol neurolysis, and the effects were shown to last for up to 6 months. Improvements in PROM were seen in patients treated with phenol. However, an adequate measure of shoulder pain was not reported. The most common side-effect reported in both studies was a transient soreness over the injection site.

**Authors' conclusions**

There was evidence of the effectiveness of BTX-A treatment on reducing muscle tone and improving PROM. The authors also stated that the effectiveness of BTX-A treatment on improving functional abilities could not be convincingly demonstrated. Larger controlled studies are needed.

**CRD commentary**

The authors posed a clear review question and reported suitable inclusion and exclusion criteria. The searches appear to have been comprehensive. The assessment of study validity was well reported and appropriate. The study selection and data extraction processes were not described, but details of the studies were tabulated clearly. The results were summarised appropriately and the authors presented an informative discussion of study design and quality. The authors' conclusions follow from the data presented.

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

**Practice:** The authors stated that there is evidence of the effectiveness of BTX-A treatment on reducing muscle tone and improving PROM at all arm-hand levels in chronic stroke patients for approximately 3 to 4 months. There was also preliminary evidence of a synergistic effect of concomitant ES. The authors stated that two subgroups, which might specifically benefit at a function level from BTX-A treatment, may be identified: patients with mild spasticity and a potential for voluntary extensor activity; and patients with severe spasticity suffering from problems with positioning and taking care of the affected arm and hand.

**Research:** The authors stated that larger controlled studies are needed to compare the effectiveness of BTX-A and other focal spasmylytic techniques. These studies should pay special attention to individual goal assessment, the duration of functional benefits, co-treatment and aftercare, side-effects and cost-effectiveness. The authors also stated that
controlled comparative studies of alcohol neurolysis and phenol neuromuscular blockade are urgently needed.

**Bibliographic details**

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12019580

**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Botulinum Toxins /therapeutic use; Female; Humans; Male; Muscle Spasticity /etiopathogenesis /rehabilitation; Nerve Block /methods; Neuromuscular Blockade /methods; Prognosis; Randomized Controlled Trials as Topic; Recovery of Function; Sensitivity and Specificity; Stroke /complications /rehabilitation; Treatment Outcome; Upper Extremity

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**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.