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Research paper

Phenol vs. botulinum toxin A injection for managing lower limb spasticity in adult patients with upper motor lesions: A randomized clinical trial

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ABSTRACT

Background: Phenol and botulinum toxin type A (BTX-A) injections are two options for treating spasticity with the ability to select a specific spastic muscle and determine the dosage based on spasticity degree. This study intends to compare the efficacy of BTX-A vs. phenol blockade in treating lower limb spasticity and to evaluate the performance improvement in gross motor functional outcomes among adult patients with upper motor neuron (UMN) lesions.

Methods: This randomized, double-blind clinical trial of 28 spastic lower limb adult patients with UMN was diagnosed between March 1, 2017, to April 30, 2019. Patients were randomized in a 1:1 ratio to a "BTX-A injections" or a "Phenol injections" group. The outcomes were measured through assessment spasticity by the Modified Ashworth Scale (MAS), active range of motion (AROM) of lower limb joint by a goniometer, Verbal Rating Scale (VRS), Visual Analog Scale (VAS), and Penn Spasm Frequency Scale (PSFS) as a baseline and post-injection follow-up at 24 hours, 3 weeks, and 3 months.

Results: All 28 randomized patients were analyzed. No significant difference between the two study arms, neither in demographic characteristics nor in MAS, AROM, VRS, VAS, and PSFS parameters prior to the procedures. AROM showed a significant decrease from baseline throughout the study in the phenol group. While in the BTX-A group, they improved significantly at 3 weeks; no more improvement was observed at 3 months, and the differences were statistically significant ($p < 0.05$). The reduction in MAS, VRS, VAS, and PSFS was statistically significant in each group at 24 hours, 3 weeks, and 3 months after the injection ($p < 0.05$). However, the differences were not significant between the phenol and BTX-A groups ($p > 0.05$), except for PSFS at the 3 months of follow-up in the Phenol group ($p = 0.01$). The need for re-injection at 6 months and 9 months was that 5 patients vs. 0 patients ($p = 0.01$) and 8 patients vs. 3 patients ($p = 0.04$) in the BTX-A and phenol groups, respectively, were statistically significant.

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CONCLUSION

Phenol injection showed superior treatment effects in AROM, decreased spasm degree based on PSFS at 3 months, and less frequent re-injection rate compared to BTX-A injections in adult patients with UMN lesions. However, both phenol and BTX-A injections effectively reduce spasticity without significant differences in efficacy and adverse effects. Future studies must be conducted with a longer duration of follow-up, and larger sample sizes better to compare both drugs' effectiveness and side effects.

List of Abbreviations

BTX-A, botulinum toxin type A; UMN, upper motor neuron; MAS, Modified Ashworth Scale; AROM, active range of motion; VRS, Verbal Rating Scale; VAS, Visual Analog Scale; PSFS, Penn Spasm Frequency Scale.

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Authors' Contributions

Hamid Reza Farpour and Seyedeh Yasamin Parvar participated in the design of this study; they both performed the statistical analysis and collaborated in the discussion. Faisal Ahmed, Azadeh Hajihosseini, and Hossein-Ali Nikbakht carried out the study and collected important background information. Narges Ghamari and Mohamed Badheeb participated in drafting the manuscript. All authors read and approved the final manuscript.

Competing Interests

The authors of this study declined to declare any competing interests.

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