BOTULINUM THERAPY AND MULTIMODAL STIMULATION IN POST-STROKE PATIENTS WITH SPASTICITY

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Abstract

Upper limb spasticity develops in ~30% of patients after stroke [1]. Botulinum toxin A (BTA) is considered the main treatment as a focal myorelaxant. In recent years, combining BTA with early neurorehabilitation, multimodal stimulation, and local preparations has become an urgent direction.

Keywords: botulinum therapy, multimodal, innovative, neurorehabilitation, spasticity

Pathogenesis and Clinical Significance

Damage to the corticospinal tracts results in a reduction of inhibitory influence, leading to increased muscle tone and reflexes.

Key consequences include hypertonia, pathological synergy, contracture, pain, and fibrosis. This condition restricts voluntary movement of the affected limb and diminishes the effectiveness of rehabilitation.

Clinical Evidence for Botulinum Toxin A Therapy

BTA expands the range of passive movement and reduces pain, proving effective in contracture prevention [1]. Meta-analyses recommend BTA as "first-line" therapy for post-stroke focal spasticity.

Multimodal Stimulation

Following botulinum therapy, a comprehensive approach is applied, combining functional electrical stimulation (FES), robotic exoskeletons, neurointerfaces, and specialized therapeutic exercise. The "therapeutic window" effect: BTA reduces muscle tone, thereby enhancing neuroplasticity and increasing the response to rehabilitation exercises.

In a randomized study involving 84 patients, comprehensive rehabilitation significantly improved Ashworth and Fugl–Meyer scores.

Ultrasound-guided individualized injections:

Visualization of the target muscle through ultrasound reduces the risk of unintended drug spread, ensures precise dosing, and enhances treatment effectiveness.

Innovative approaches:

Individualized dosing, ultrasound-guided injections, multimodal stimulation, and the use of local medications (such as Relatox) open new opportunities for restoring hand function. Future research is aimed at improving active motor recovery and refining individualized rehabilitation protocols.

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