

Predicting disease-related changes in jaw contribution to tongue movement in ALS based on a diadochokinetic task

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Increased jaw contribution to tongue movement has been robustly detected in individuals at early stages of ALS, which was demonstrated to be a compensatory strategy to mitigate tongue movement reduction. This compensatory strategy, however, becomes unavailable during the late stages of ALS. We predicted that an individual's capacity to use jaw compensation during speech will depend on the extent of jaw motor involvement, as indexed by jaw performance on the diadochokinetic (DDK) task. We screened 17 variables representative of the spatial, temporal, and spatiotemporal features of jaw DDK performance and examined their relationships with the extent of jaw contribution to tongue movement in eight participants with varying severity of ALS. The results suggested that three variables (i.e., spatiotemporal variability index, maximum velocity, and number of syllable repetitions) jointly predicted 66% of the variance in jaw contribution to tongue movement. A further assessment of disease-related changes in these variables suggested that the loss of jaw compensation was associated with increased variability and decreased speed of jaw movement. The findings may improve our understanding of the neuromotor basis of disease-related changes in tongue-jaw coordination in ALS and provide preliminary support for using jaw DDK features as clinical markers for disease progress monitoring.