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RECEIVER OPERATING CHARACTERISTICS (ROC) ANALYSIS OF EXTERNAL SPHINCTER ELECTROMYOGRAPHY FOR DIFFERENTIATING MULTIPLE SYSTEM ATROPHY FROM OTHER PARKINSONIAN SYNDROME

Hypothesis / aims of study

External anal sphincter electromyography EMG (EAS-EMG) is an established method to detect neurogenic change of the sphincter muscle [1]. However, the diagnostic criteria defining “neurogenic change” in EAS-EMG are controversial [2]. We performed receiver operating characteristics (ROC) analysis to determine the appropriate MUP parameter to differentiate MSA from other parkinsonian syndromes and to determine the desirable Fowler’s criteria.

Study design, materials and methods

We retrospectively reviewed 445 case records where EMG cystometry with pressure flow studies and single MUP analysis were performed in patients with parkinsonian syndromes like MSA, n = 267; Parkinson’s disease (PD), n = 129; Dementia with lewy bodies (DLB), n = 25; and progressive supranuclear palsy (PSP), n = 24. The following was determined by the analysis: 1) the appropriate motor unit potential (MUP) parameter among duration, phase, and amplitude; 2) the desirable parameter of Fowler’s criteria; i.e., more than 20% MUPs having >10 ms duration (criteria a) or mean duration of MUPs > 10 ms (criteria b). We performed ROC analysis of the data sets.

Results

The ROC analysis revealed that the area under the ROC curve (AUC) used to differentiate MSA from other parkinsonian syndromes was 0.70 in duration, 0.62 in phase and 0.51 in amplitude, respectively; these values were statistically significant (Figure 1). With regards to Fowler’s criteria, AUC was 0.70 for the average duration of MUPs (criteria a) and 0.67 for percentage of MUPs of duration >10 ms (criteria b); these values were also statistically significant (Figure 2).

Interpretation of results

The availability of a relatively large number of patients with parkinsonian syndromes, including many with MSA in this study, facilitated the determination of the most appropriate MUP parameter to differentiate MSA from other parkinsonian diseases using the ROC analysis.

The results of ROC analysis suggested that mean duration may be the most appropriate parameter to differentiate MSA from other parkinsonian syndromes, followed by the mean number of phases. The mean amplitude of the MUPs may be not useful for differentiation, because the AUC for mean amplitude was only 0.52. However, the AUC in mean duration and mean number of phases were not sufficiently high to well differentiate MSA from other parkinsonian syndromes.

Concluding message

ROC analysis suggests that duration of MUPs is appropriate for the differentiation of MSA. However, the AUC of the mean duration was insufficient to confirm the diagnosis; EAS-EMG should be used as a supportive diagnostic tool for diagnosis of MSA.

Figure 1 ROC curves for MUP parameters between MSA and other parkinsonisms.

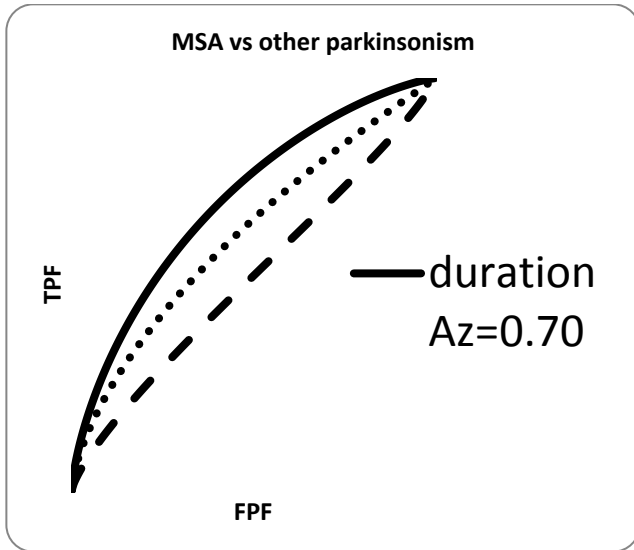
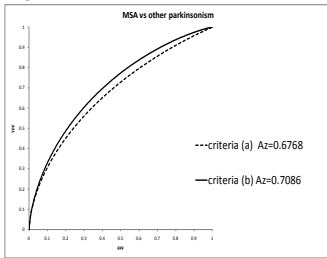


Figure 2 Comparison of criteria (a) and criteria (b) in Fowler's criteria.



References

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Is this study registered in a public clinical trials registry?	No
Is this a Randomised Controlled Trial (RCT)?	No
What were the subjects in the study?	HUMAN
Was this study approved by an ethics committee?	Yes
Specify Name of Ethics Committee	Chiba University
Was the Declaration of Helsinki followed?	Yes
Was informed consent obtained from the patients?	Yes