Surface electromyography analysis of blepharoptosis correction by transconjunctival incisions

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Upper eyelid movement depends on the antagonistic actions of orbicularis oculi muscle and levator aponeurosis. Blepharoptosis is an abnormal drooping of upper eyelid margin with the eye in primary position of gaze. Transconjunctival incisions for upper eyelid ptosis correction have been a well-developed technique. Conventional prognosis however depends on clinical observations and lacks a quantitatively analysis for the eyelid muscle controlling. This study examines the possibility of using the assessments of temporal correlation in surface electromyography (SEMG) as a quantitative description for the change of muscle controlling after operation. Eyelid SEMG was measured from patients with blepharoptosis preoperatively and postoperatively, as well as, for comparative study, from young and aged normal subjects. The data were reanalyzed using the detrended fluctuation analysis method. The average DFA α index values for all of the eyes from the young and aged normal groups and the patient group from before and after the operations are plotted in Fig. 7. The results show that the temporal correlation of the SEMG signals can be characterized by two indices associated with the correlation properties in short and long time scales demarcated at 3 ms, corresponding to the time scale of neural response. Aging causes degradation of the correlation properties at both time scales, and patient group likely possess more serious correlation degradation in long-time regime which was improved moderately by the ptosis corrections. We propose that the temporal correlation in SEMG signals may be regarded as an indicator for evaluating the performance of eyelid muscle controlling in postoperative recovery.

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