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Predicting postoperative segmental upper extremity motor paresis after cervical laminoplasty by intraoperative neurophysiological monitoring using transcranial electrically stimulated muscle evoked potentials (TcE-MsEPs)

Introduction: Postoperative segmental upper extremity motor paresis in deltoid muscle and biceps brachii muscle (so-called "C5 palsy"), is one of the most common postoperative complications after cervical laminoplasty. The efficacy of transcranial electrically stimulated muscle evoked potentials (TcMsEPs) is still controversial, because some papers have reported that postoperative C5 palsy cannot be predicted by TcMsEPs, although others have reported that it can be predicted. In this paper, we describe our prospective study for predicting postoperative C5 palsy using TcMsEPs.

Methods: This study included 160 consecutive cases that underwent open door laminoplasty, and TcMsEP monitoring was performed in the biceps brachii, triceps brachii, abductor digiti minimi, tibialis anterior and abductor hallucis. A more than 50% decrease in the wave amplitude was defined as an alarm point. When alarm was given, rescue interventions were performed including steroid, foraminotomy etc.

Results: Postoperative C5 palsy occurred in five cases. Among the 155 cases without C5 palsy, there were no monitoring alarms. Among the five C5 palsy cases, significant wave amplitude decrease in biceps in three cases in which the C5 palsy occurred immediately after surgery (acute type). Although foraminotomies and steroid administration were performed, wave amplitudes did not recover. C5 palsy occurred immediately after surgery. In the other two cases where the C5 palsy occurred two days after the operation (delayed type), there were no significant wave decrease. In all of the cases, the C5 palsy was completely resolved within 6 months.

Discussion: Majority of C5 palsy occurred several days following surgery, but some of them occurred immediately after surgery. Our results demonstrated that TcMsEPs can predict acute type C5 palsy, although delayed C5 palsy cannot be predicted. A more than 50% decrease in the wave amplitude is useful to predict acute type C5 palsy. In this series, we could predict the occurrence of acute C5 palsy in three cases, but we could not prevent the occurrence of the palsy. Further examinations about the intervention for monitoring alarm will be essential in order to prevent C5 palsy.

Key words; cervical laminoplasty, intraoperative neurophysiological monitoring, postoperative C5 palsy