척수재활

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Concordance between motor exam of ISNCSCI and needle electromyography

Jeehyun Yoo[1†], Kil-Byung Lim[1], Jiyong Kim[1], Hojin Lee[1], Ha-Seong Kim[1], Sang Wan Lee[1*]

Ilsanpaik Hospital, Inje University, Department of Physical Medicine and Rehabilitation[1]

Objective

The International Standards for Neurological Classification of Spinal Cord Injury(ISNCSCI) is used for neurologic evaluation of spinal cord injury(SCI) patients. Early detection of motor recovery and adequate training of trace powered muscles are important for improved outcome in rehabilitation. It is also important to distinguish between ASIA impairment scale(AIS) B or AIS C because prognosis of them is quite different. For determination as AIS C, sparing of key or non-key muscle function more than 3 levels below motor level on a given side is needed. However, to distinguish whether trace or zero by manual muscle test has some difficulty. If there is no visual movement of muscle, and physiatrist should determine this muscle's power by his hand to feel muscle contraction. The purpose of this study is to evaluate the accuracy of motor exam when motor grade is zero or trace, by confirming needle electromyography (EMG).

Methods

We reviewed recordings of SCI patients who admitted to our hospital from January, 2013 to June, 2019, and performed needle EMG of key muscles. Then, we reviewed results of needle electromyography of key muscle which was determined as zero or trace by motor exam of ISNCSCI. We assumed that if muscle strength was zero, there would be no detection of motor unit action potential(MUAP), and if muscle strength was trace, there would be any MUAPs. Cohen's kappa coefficients were used to determine the agreement between motor exam of ISNCSCI and needle EMG when motor grade was zero or trace.

Results

Total 25 patients and their 175 key muscles which were determined as zero or trace by motor exam were performed needle EMGs. Cohen's kappa coefficient, which indicates agreement between motor exam and needle EMG, showed fair agreement (k=0.309). In case of key muscles which was determined as zero by motor exam, 80% of them were confirmed as zero by needle EMG. However, in case of key muscles which was determined as trace by motor exam, 50% of them were confirmed as zero by needle EMG (Table 1). Based on the each key muscles, T1 showed almost perfect agreement (k=1.000), L2 showed fair agreement (k=0.359), and S1 showed moderate agreement (0.521). Other key muscles didn’t show any agreement.

Conclusion

Concordance between motor exam of ISNCSCI and needle EMG when motor grade was zero or trace was fair degree. However, when motor grade was trace, concordance rate was lower than when motor grade was zero. For accuracy of motor exam and exact determination for ASIA impairment scale, needle EMG confirmation would be helpful when motor grade is zero or trace.

Table 1. Concordance between motor grade and presence of MUAP

		MUAP	
		No	Yes
MMT	Zero	92(80%)	23(20%)
	Trace	30(50%)	30(50%)