P 2-58

Nerve conduction study and shoulder motor power in children with brachial plexus injury

Sehee Kim[1*], Joon-Sung Kim[1], Seong Hoon Lim[1], Bomi Sul[1], Bo Young Hong[1†]

St. Vincent's Hospital, College of Medicine, The Catholic University of Korea, Department of Rehabilitation Medicine[1]

Introduction

The brachial plexus is a network of nerve fibers that run from the spine and supplies the musculature of the arms. One of the most common causes of brachial plexus injury (BPI) of infants include force during delivery and excessive stretching. When an infant has a brachial plexus injury, it can happen to any part of the nerve fibers, therefore, the clinical features differ from patient to patient. Like adults, pediatric patients are diagnosed with BPI by clinical symptoms also with nerve conduction studies (NCS) and electromyography (EMG) or imaging study such as magnetic resonance imaging.

Objective

Electrodiagnosis performed in children is often ends with minimal and an incomplete study due to poor cooperation. Therefore, it is difficult to judge how relevant electrodiagnostic Results are to clinical features beside diagnostic role. To investigate their prognostic role of electrodiagnosis, especially on functional shoulder movement of children, we assessed the relationship between the electrodiagnostic Results and muscle power of shoulder flexion.

Method

A retrospective chart review was done in children who visited rehabilitation department outpatient clinic from January 2009 to October 2017 with diagnosis of BPI. Among 29 children, 19 patients had record of electrodiagnostic studies. A child with brain lesion was excluded and 18 patients were divided into two groups based on the muscle power of shoulder flexion. Those two groups are as follows: a group with shoulder flexion power above fair grade in the manual muscle test, and the other group with less than fair grade. The manual muscle test (MMT) was based on the time of the EMG, and one of them was excluded from the group because there was no Result of MMT on the chart. Amplitude ratio in percentage was used which is calculated as amplitude of affected side divided by the amplitude of the unaffected side on each nerve. In case of not evoked, the amplitude ratio was regarded as zero. A Mann-whitney test was done to determine statistical differences of the ratio of amplitudes of NCS between two groups.

Result

At the time of the electrodiagnosis test, the mean age of 18 patients was 425.68 ± 447.25 days. And the mean of birth weight is 3831.66 ± 803.09 gram. Clinical characteristics are as in Table 1. There was no statistically significant difference between the two groups on amplitude of NCS in all sampled nerves (Table 2).

Conclusion

It is important to determine when to perform the NCS and EMG for accurate diagnosis. It seems that the electrodiagnostic Results of children does not correlate with severity of shoulder flexion. However, in this study, there is a limit to reflect only the power of shoulder flexion among clinical features. And the age of NCS study was quite variable. Further cumulative and prospective data are needed to figure out the correlation between electrodiagnostic Results and functional movement.

Table 1. Clinical characteristics of subjects

Clinical characteristics	N=18
Age of initial visit (days)	437.05 ± 461.98
Age of initial NCS(days)	448.31 ± 448.58
Gestational age(weeks)	38.17 ± 1.77
Gender (male : female)	9 : 9
Side involved (Right : Left)	12:6
Birth weight (g)	3831.66 ± 803.09

Values are presented as mean ± standard deviation

Table 2. Amplitudes ratio according to motor power of shoulder flexion

	Shoulder flexion		Total	*P* value
	Fair or more	Less than fair		
Nerves	N=10	N=7	N=18	
Median sensory-first digit	39.1±55.1	25.0±35.3	34.4±27.7	0.481
Median sensory	48.0±51.0	66.3±37.4	58.4±27.7	0.215
Ulnar sensory	62.3±45.9	46.2±43.0	62.1±44.0	0.68
Radial sensory	21.1±31.7	3.2±6.4	15.2±24.1	0.467
Lateral antebrachial cutaneous sensory	70.4±5.51	0	46.9±40.8	0.221
Median motor	60.5±42.4	92.5±84.8	78.3±62.1	0.462
Ulnar motor	59.9±40.4	55.8±49.2	65.4±44.3	0.515
Axillary motor	70.6±51.4	68.5±54.3	90.8±95.3	0.699
Musculocutaneous motor	79.0±58.3	60.8±51.5	72.0±54.3	0.588

Values are presented as mean ± standard deviation