Evaluation of Electrophysiological Response to Thymectomy in Patients with Myasthenia Gravis

Rawiphan Witoonpanich MD, FRCP*

** Department of Medicine, Faculty of Medicine, Ramathibodi Hospital, Mahidol University*

Clinical response to thymectomy in patients with myasthenia gravis varies in terms of timing and degree of improvement. Electrophysiological test is a reasonably reliable and objective way to evaluate neuromuscular transmission in these patients. The purpose of this study was to evaluate the electrophysiological response before and after thymectomy by repetitive nerve stimulation test in order to estimate the timing of initial improvement, progress and degree of improvement after thymectomy. According to electrophysiological findings, it appeared that neuromuscular transmission in these patients might have begun to improve even as early as one week after thymectomy and steadily improved by the end of one year of the study corresponding to clinical improvement.

Keywords : *Myasthenia gravis, Thymectomy, Repetitive nerve stimulation test, Improvement*

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Thymectomy has generally been accepted as the best definitive treatment in most patients with myasthenia gravis (MG). It has been shown by clinical response that thymectomy resulted in remission in about one-third and improvement in almost two-thirds of the patients. However, clinical response to thymectomy in these patients varies in terms of timing and degree of improvement. Electrophysiological test is a reasonably reliable and objective way to evaluate neuromuscular transmission in these patients. The purpose of this study was to evaluate the electrophysiological response before and serially after thymectomy by repetitive nerve stimulation test in order to estimate the timing of initial improvement, progress and degree of improvement after thymectomy.

Material and Method

Twelve patients were included in the present study. They were all female, aged between 23-49 years (mean age = 36.6 years) with duration of illness before thymectomy of 2 months to 8 years (mean = 18 months). The severity grading was grade IIa in 6 cases, IIb in 4 cases and III in 2 cases. They were taking pyridostigmine at the dose of 4-6 tablets a day and were not on corticosteroid. Histological study of the thymus gland showed lymphoid hyperplasia in all except one which was benign thymoma. Repetitive nerve stimulation test (RNST) was performed on each patient on admission for thymectomy and then one week, one month, three months, six months and one year after thymectomy. Each patient had her last dose of pyridostigmine nineteen or twenty hours before the test (taking the last dose at 6.00 pm the evening before and having the test at 1.00 or 2.00 pm). A number of patients were severely ill prior to operation and could not be readily extubated. These patients could not maintain adequate muscle power or respiration on withholding the medication for a long period soon after operation. Therefore, this small group of patients was excluded from the study.

On each occasion, six successive supramaximal stimuli of 0.2 msec duration were delivered at 3 Hz to 3 nerves, i.e., the ulnar nerve at the wrist, the accessory nerve at the neck and the facial nerve in front of the ear. The compound muscle action potentials (CMAP) were recorded from the adductor digiti minimi (ADM), nasalis and upper trapezius muscles. Each nerve was stimulated by 5 trains of five 3 Hz stimuli. The amplitude of the fourth potential was compared to that of the first. The decrements were then recorded and averaged. Improvement was calculated as percent

Correspondence to : Witoonpanich R, Division of Neurology, Department of Medicine, Ramathibodi Hospital, Rama 6 Road, Bangkok 10400, Thailand. Phone: 0-2201-1386, Fax: 0-2201-1386, E-mail: rarwt@mahidol.ac.th

reduction of decrement compared to pre-operative values. Any degree of reduction of decrement was considered an improvement because it has been shown that there is good correlation between electrophysiological and clinical severity in MG[1]. Furthermore, this report aimed to show the progressive improvement with time in the electrophysiological aspect.

Results

A decrement greater than 8-10% has been universally accepted as abnormal[2]. In this study, a decrement greater than 8% was considered to be abnormal.

Before thymectomy, abnormal decremental response was detected in 50%, 86% and 100% in ADM, trapezius and nasalis muscles respectively. Therefore, nasalis muscle appeared to be the most sensitive and reliable for detecting abnormal neuromuscular transmission.

After thymectomy, improvement could be detected electrophysiologically in some of the muscles in every patient as early as one week postoperatively when about 73% of muscles in all patients together showed an average of 48% improvement. At one month, 75% of the muscles showed an average of 69% improvement. The values of these parameters were 75% and 64%, 71% and 73%, 82% and 80% at three months, six months and one year respectively. The detailed improvement in each muscle of all patients is shown in Table 1. Average proportion of muscles which showed improvement was 75%.

Table 1. Percent improvement of each muscle calculated as percent of reduction of CMAP amplitude decrement as compared to pre-operative values

Time	Muscle ADM %	Nasalis %	Trapezius %	Average %
1 week	37	52	56	48
1 month	56	65	87	69
3 months	78	52	63	64
6 months	78	69	73	73
12 months	84	77	78	80

Discussion

RNST is the most commonly used technique for studying neuromuscular transmission disorder because of its relative simplicity and reliability with rapid results. There is also good correlation between electrophysiological and clinical assessment of disease severity in MG[1]. Therefore, RNST offers an effective and objective means of diagnosis, evaluation of severity and follow-up evaluation of MG after treatment.

It has always been one's clinical impression that most patients with MG improved very soon after thymectomy although there was a number of patients who were severely ill prior to operation and could not be readily extubated. Patients who steadily improved could maintain reasonable muscle power for as long as 20 hours at one week after operation. This clinical impression was supported by the 48% improvement at one week from this electrophysiological study. After the initial improvement, all patients went on improving slowly but there was some fluctuation in the findings between one and three months. From six months to one year, there was slow but steady further improvement. At one year the improvement was approximately 80% and the patients were very well clinically taking only 1-3 tablets of pyridostigmine a day. These clinical and electrophysiological responses correlate well with previous findings of a steady decrease in antibodies to the acetylcholine receptors from six weeks after thymectomy[3]. The present study showed that neuromuscular transmission might have begun to improve even as early as one week after thymectomy and steadily improved up to 80% by the end of one year.

References

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การประเมินผลของการผ่าตัดต่อมไทมัสในผู้ป่วยโรคมัยแอสทีเนียแกรวิสด้วยการตรวจทางประสาทสรีรวิทยา

รวิพรรณ วิทูรพณิชย์

การผ่าตัดต่อมไทมัสในผู้ป่วยมัยแอสทีเนียแกรวิสมักได้ผลดี แต่ระยะเวลาที่เริ่มดีขึ้น และดีขึ้นมากน้อยเพียงใดนั้นขึ้นกับผู้ป่วยแต่ละราย การตรวจทางประสาทสรีรวิทยาเป็นวิธีที่สามารถประเมินการสื่อประสาทสู่กล้ามเนื้อในผู้ป่วยเหล่านี้ได้ดีพอควร จุดประสงค์ของการศึกษานี้ก็เพื่อประเมินการเปลี่ยนแปลงทางประสาทสรีรวิทยาก่อนและหลังการผ่าตัดต่อมไทมัสโดยวิธีกระตุ้นประสาทซ้ำ ๆ เพื่อคาดคะเนเวลาที่ผู้ป่วยเริ่มดีขึ้น ดีขึ้นเร็วย ๆ หรือไม่ และดีขึ้นมากน้อยเพียงใดหลังการผ่าตัด จากผลการศึกษาเชื่อได้ว่าการสื่อประสาทสู่กล้ามเนื้อในผู้ป่วยเหล่านี้ดีขึ้นภายในหนึ่งสัปดาห์หลังผ่าตัด และดีขึ้นเร็วย ๆ ตลอดหนึ่งปีที่ทำการศึกษาเช่นเดียวกับอาการทางคลินิกที่ดีขึ้นด้วย