Treatment of dystonia with chronic deep brain stimulation: Effect and patient selection

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Abstract

Deep brain stimulation (DBS) has increasingly received much attention as a therapeutic option for patients with dystonia. While, excellent therapeutic effects were obtained in many patients, some patients had poor results. Based on our experience, we discuss predictors of good therapeutic effects. We analyzed follow-up data obtained from a consecutive series of 38 patients with dystonia who underwent functional stereotactic neurosurgical treatment. Of the 38 patients, 35 underwent the DBS (GPi-DBS in 30 patients, Vo/Vim-DBS in 5 patients). Of the 30 patients who underwent the GPi-DBS, 26 were primary dystonia, and the remaining 4 patients had various causes of secondary dystonia including stroke, trauma, and cerebral palsy. Thalamic (Vo/Vim) DBS was performed in 5 patients with writer’s cramp. At a follow-up observation after more than 6 months, the overall evaluation by BFMDRS (Burke Fahn and Marsden Dystonia Rating Scale) was 70% improvement and patients evaluated by TWSTRS (Toronto Western Spasmodic Torticollis Rating Scale) showed 61% improvement. Statistical analysis showed that the improvement rate for primary dystonia was higher than that for secondary dystonia. A shorter disease history before surgery and early age at onset were also found to be significant predictor of good clinical results of GPi-DBS. In addition, patients with a forced dystonic posture and a forward-bent of trunk demonstrated excellent improvement by GPi-DBS.

2. METHODS

We analyzed follow-up data obtained from a consecutive series of 38 patients with dystonia who underwent functional stereotactic neurosurgical treatment. Of the 38 patients, 35 underwent the chronic DBS (GPi-DBS in 30 patients, Vo/Vim-DBS in 5 patients), 2 underwent thalamotomy and one patient underwent pallidotomy.

Electrophysiological data obtained from single- and multiunit extracellular recording were reconstructed on stereotactic coordinates on the basis of magnetic resonance imaging (MRI). The site of DBS electrode placement was also verified by postoperative MRI. The stimulation system was internalized after a postoperative test stimulation of 7 days duration. The stimulation parameters were modified by the physicians at each follow-up visit, on the basis of neurological examination as well as the patient’s report concerning daily activities. BFMDRS (Burke Fahn and Marsden Dystonia Rating Scale) and/or TWSTRS (Toronto Western Spasmodic Torticollis Rating Scale)
was employed for the evaluation of the seriousness of dystonia pre- and postoperatively.

3. RESULTS

Of the 30 patients who underwent the GPi-DBS, 26 were primary dystonia, and no DYT 1 mutation was found in any of these patients. The remaining 4 patients had various causes of secondary dystonia including stroke, trauma, and cerebral palsy. Thalamic (Vo/Vim) DBS was performed in 5 patients with writer’s cramp, one of whom also underwent GPi electrode implantation for test stimulation.

At a follow-up observation after more than 6 months, the overall evaluation by BFMDRS was 70% improvement and patients evaluated by TWSTRS showed 61% improvement. Statistical analysis showed that the improvement rate for primary dystonia was higher than that for secondary dystonia. A shorter disease history before surgery and early age at onset were also found to be significant predictors of good clinical results of GPi-DBS. In addition, patients with a forced dystonic posture and a forward-bent of trunk demonstrated excellent improvement by GPi-DBS. On the other hand, in all of 5 patients with writer’s cramp, Vo/Vim-DBS produced complete control, in one of them we compared the effects of GPi-DBS and Vo/Vim-DBS. The results obtained for this patient strongly suggest that better outcome can be expected to Vo/Vim-DBS as compared to GPi-DBS in writer’s cramp.

4. DISCUSSION AND CONCLUSIONS

Effects of GPi-DBS on various forms of dystonia were reported previously by several authors. The improvement rates in score of various types of dystonia including primary or secondary as well as generalized or focal varieties reported in literature have a wide range. An excellent effect was reported especially in DYT1 [1]. Eltahawy HA and his colleagues [2] indicated that primary dystonia responds much better than secondary dystonia to pallidal procedure. Also, they mentioned that the presence of basal ganglia abnormalities demonstrated by preoperative MRI is an indicator of a poor response to pallidal intervention for dystonia.

According to our experience, primary, early age at onset, shorter history before surgery and dystonic posture with forward-bent trunk could be regarded as a predictive factor for good response to GPi-DBS. These results of this study add further support to GPi-DBS as an effective treatment for dystonia and provide important information as to predictors of good outcome. This knowledge is important for the provision of accurate prognostic information to patients and clinicians. Also, Vo/Vim-DBS rather than GPi-DBS is an effective treatment for the primary focal dystonia, such as writer’s cramp. It is important to define an appropriate stimulation site for each type of dystonia.

References


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