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Destructive stereotactic surgery for treatment of dystonia☆

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Abstract

Background: This study is a retrospective review of the results of stereotactic destructive surgery in selected cases of drug-resistant dystonia.

Methods: Fifty-eight patients with drug-resistant dystonia were treated with stereotactic surgery between 1991 and 1999 in our institution. These patients' charts were retrospectively analyzed. The timing of the conducted evaluations was as follows: preoperatively, postoperatively, in the postoperative 1st week, 6th month, 12th month, and also thereafter every year.

Results: Symptoms of dystonia occurred before the age of 10 years in 30 patients (51.8%) and after the age of 10 years in 28 patients (48.2%). Generalized dystonia was detected in 41 patients, whereas 11 patients had hemidystonia, 5 patients had focal dystonia, and 1 patient had segmental dystonia. The most common etiologic factor was CP (n = 34). A total of 103 ablative lesions were created in 86 surgical sessions. Thalamotomy, pallidotomy, subthalamotomy, and the region of Forel lesions were performed either separately or in combination. In this series, the mean follow-up time was 102.2 months. Except for 2 cases of temporary hemiparesis, no other complications were observed. Minor improvement was obtained in 17 patients (19.7%), improvement of a medium degree was obtained in 17 patients (19.7%), high-degree improvement was obtained in 11 (12.8%), and very high degree improvement was obtained in 16 (18.6%) patients. A final evaluation revealed permanent improvement in 32 patients (55.2%).

Conclusion: Production of stereotactic destructive lesions in certain specified targets is a safe method that improves quality of life and aids ambulation in patients with dystonia resistant to medical therapy.

Keywords: Stereotactic surgery; Dystonia; Destructive; Drug resistance

1. Introduction

Dystonia is a movement disorder that can be described as the uncontrolled and continuous contraction of the muscle groups. Dystonia can be of genetic origin or can develop secondary to certain central nervous system diseases [4,11,12,22,35]. In treating dystonia, the first choice should be medical therapy, but the side effects or ineffectiveness can render medical therapy useless. In such cases, surgical therapy can be an alternative [2,3,6,7,13,15,16,20,34,41].

This retrospective study was designed to evaluate the effectiveness of stereotactic destructive surgery in patients with drug-resistant dystonia and also to compare and analyze the results of lesions produced in different targets. The medical records of 58 patients who were diagnosed as having either idiopathic or secondary dystonia, and who

Abbreviations: CP, cerebral palsy; FMDS, Fahn-Marsden Dystonia Scale; HSD, Hallervorden-Spatz disease; ITD, idiopathic torsion dystonia; MS, multiple sclerosis; NWUDS, Northwestern University Deficiency Scale; VIM, ventralis intermedius; VOP, ventralis oralis posterior.

☆ We confirm that all human studies have been approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. All persons gave their informed consent before their inclusion in the study. Details that might disclose the identity of the subjects under study were omitted.

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Table 1
Distribution of dystonic cases according to etiology

	n	%
Primary	12	20.7
ITD	11	19
Spasmodic torticollis	1	1.7
Secondary	46	79.3
CP	34	58.6
Perinatal hypoxia	11	18.9
Hyperbilirubinemia (in newborn)	3	5.17
Convulsions (in newborn)	2	3.4
Meningitis/encephalitis	13	24
Posttraumatic	5	8.6
HSD	3	5.2
Pyramidocerebellar degenerative disease	1	1.4
MS	1	1.4
Poststroke	1	1.4
Intracerebral hemorrhage	1	1.4
Total	58	100

were surgically treated between 1991 and 1999 in Department of Neurosurgery, Istanbul Faculty of Medicine, Istanbul University, were retrospectively analyzed.

2. Methods

2.1. Patients

The study group consisted of patients who were diagnosed as having dystonia and who could not benefit from medical treatment either because of side effects or because of inadequate/insufficient efficacy.

2.2. Procedures

The stereotactic procedures were performed by computed tomography guidance with local anesthesia in adults and with general anesthesia in children and in patients with severe muscle contractions. Leksell stereotactic apparatus (Elekta AB, Stockholm, Sweden) was used in the interventions. The posterior and anterior commissures were defined, and the coordinates of the midcommissural point were calculated under computed tomography guidance. After the preparation of the precoronal burr hole, the dura mater was opened. The electrode was advanced to the target. The correct localization was confirmed by macrostimulation. A destructive lesion was produced by controlling the intensity of current. The maximum diameter of the lesions was 0.5 cm. In case of uncertainty about the target localization or any sign of problem during stimulation (hemiparesis, paresthesias), the procedure was cancelled. The terminology of Hassler [18] was used in this study [7].

2.3. Evaluation of the cases

The patients were video-recorded preoperatively and were followed-up in the postoperative first week, sixth month, and first year, and yearly thereafter. Patients were evaluated by using FMDS and NWUDS, and after each surgical procedure, early and long-term improvement ratios were determined. Six groups were formed on the basis of the percentage ratios. These groups were designated as A (improvement of very high degree, >40%), B (improvement of high degree, 20%-40%), C (improvement of medium degree, 10%-20%), D (improvement of low degree, 10%-20%), E (no improvement), and F (deterioration). The cases in the first 3 groups (A, B, C) were considered successful. After the production of each lesion, the relationship between the quantity of improvement and the localization of the lesion was analyzed. The mean follow-up time for these cases was 102.2 months (range, 6-154 months).

2.4. Statistical analysis

χ^2 Test was used to compare the 2 different groups. P values of less than .05 were accepted as significant.

3. Results

In this study, 28 of 58 patients were female (48.2%) and 30 were male (51.7%). The mean age was 17.3 ± 9.1 years with a range of 5 to 47 years. The mean duration of the disease before the operation was found to be 10.8 ± 7 years with a range of 2 to 34 years.

3.1. Distribution of the patients regarding the anatomic localization and etiology

Clinical presentations of the patients were classified as follows: 41 patients (70.1%) had generalized dystonia, 11 patients (19%) had hemidystonia, 5 patients (8.6%) had focal dystonia, and 1 patient (1.7%) had segmental dystonia (Table 1).

3.2. Lesions

In this series, 103 destructive lesions were produced in 86 separate surgical sessions. The sessions consisted of thalamotomy (n = 63), pallidotomy (n = 32), subthalamotomy (n = 1), and lesions formed in the Forel region (n = 7). Thirty-eight patients had a single operation, and 28 of these had a single lesion (21 thalamotomies and 7 pallidotomies). Nine patients (2 cases who underwent thalamotomy and who also had destructive lesions produced in the Forel region, and 7 cases who underwent thalamotomy and pallidotomy) had unilateral multiple lesions, and 1 patient had bilateral and multiple destructive lesions (thalamotomies and pallidotomy). The remaining 20 patients had ablative lesions created in several numbers of sessions. Five of these patients had unilateral lesions, whereas 15 had bilateral lesions.

3.3. The degree of improvement regarding the lesions

Each surgical session was analyzed separately for individual patients. The degrees of the improvement that were obtained are shown in Table 2.