GPI Deep Brain Stimulation for Tourette Syndrome Improves Tics and Psychiatric Co-morbidities

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OBJECTIVE: To describe the response of a medication-refractory, 16-year-old male with severe Tourette syndrome (TS) and typical co-morbidities to bilateral deep brain stimulation (DBS) of the globus pallidus interna (GPI).

METHODS: Case report. Pre-surgical assessment included baseline cognitive and psychiatric functioning. Pre-surgical results were compared to those at 6 months and 1 year.

RESULTS: Neurophysiological evaluation assessed suitability for the procedure and established baseline cognitive and psychiatric functioning. Each evaluation included tic scales, video recordings, DBS interrogation and adjustment, and neurocognitive and neuropsychological testing.

CONCLUSIONS: Thirteen behavioral and neurocognitive measures and psychiatric scales were compared to 6 month follow-up evaluations. Measures included Yale Global Tic Severity (YGTSS), Tic Symptom Self-Report (TSS), Modified Rash Video-Based Tic Rating Scale (VTRS) scored by an independent, “blinded” rater, behavior rating scales (BASC-2, BRIEF), Child Yale-Brown Obsessive-Compulsive Scale (CY-BOCS), a quality of life measure (SF-36v2), and neurocognitive tests.

RESULTS: YGTSS improved by 84% (from 94 to 14), TSS improved by 58% (from 88 to 11), and VTRS improved by 21% (from 11 to 14). Baseline reductions were maintained during follow-up.

Neurocognitive testing showed improved verbal reasoning, psychomotor speed, memory, and visual perception, with somewhat poorer performance on a test of memory. The SF-36v2 improved by 65% (from 86 to 142). He returned to normal or near-normal levels for all cognitive and co-morbid conditions including OCD, depression, and anxiety.

A movement disorders neurologist (CK) “blinked” to the patient’s history, stimulator parameters, and timing of the videos scored the YGTSS.

Baseline and 1 year evaluations were compared to those at 6 months and 1 year:

- Yale Global Tic Severity Scale (YGTSS, administered by JP)
- Tic Symptom Self-Report
- Behavior Assessment System for Children – 2nd Edition (BASC-2)
- Behavior Rating Inventory of Executive Function (BRIEF)
- Quality of life (SF-36V2)
- Neurocognitive tests (Table 2)

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16-year-old, left-handed male delivered at full-term via C-section for cephalopelvic disproportion. He was diagnosed with TS at the age of 5 years.

Based on a single case, GPI DBS may be considered safe and effective in treating both tics and co-morbidities in severe TS.

Improvements were sustained at 1 year follow-up.

Visual, psychomotor speed, mental flexibility, and visual perception all improved.

Tics, OCDs and self-injurious behaviors (SIBs) included inappropriate touching or grabbing others; self-gagging until emesis (resulting in significant weight loss), eye-poking, facial self-scratching, self-hitting and scratching until pain disappeared (see Video).

Impaired, judgment of line orientation, plan/organize, and organize.

The final DBS parameters were achieved at 6 weeks.

Target coordinates: 22mm to the left and right of 3mm in front of, and 4mm beneath the ACP/MPC midpoint.

REF: Reference, N = number of patients, F/U = follow-up, GPI = globus pallidus interna, OCD = obsessive-compulsive disorders, depression, anxiety, panic; personality, NAC = nucleus accumbens, SIBs = self-injurious behaviors, R = patient, YGTSS = Yale Global Tic Severity Scale.

* Shahed et al. 2006