

DEEP BRAIN STIMULATION FOR CHRONIC NEUROPATHIC PAIN: LONG-TERM OUTCOME AND THE RELEVANCE OF THE INSERTIONAL EFFECT

C.Hamani, J.M. Schwalb, A.R. Rezai, J. Dostrovsky, K. Davis, A.M. Lozano

Division of Neurosurgery
Toronto Western Hospital
ww 4-447
399 Bathurst Street
Toronto, ON M5T2S8
Canada

OBJECTIVE

To evaluate the long-term results of deep brain stimulation (DBS) for intractable neuropathic pain at our institution.

METHODS

DBS systems were implanted in 20 patients with intractable, chronic, neuropathic pain from 1992 to 2004. Inclusion criteria were a minimal score of 6 on a visual analog pain scale (VAS), failure of previous medical and surgical interventions for at least 1 year, and no significant psychological or psychosocial problems. All patients had electrodes implanted in the somatosensory thalamus (Vc) contralateral to the side of the pain. In addition, 6 patients were simultaneously implanted in the periventricular gray matter (PVG) ipsilateral to Vc. Two patients had bilateral Vc electrodes implanted for the treatment of bilateral pain.

After the insertion of the DBS electrodes, patients were tested with various stimulation settings for approximately 5 days. A postoperative stimulation trial was considered successful when a higher than 50% reduction in baseline VAS scores was achieved. Patients that benefited from stimulation were implanted with pulse generators (IPG), whereas the ones that failed the trial had their electrodes removed.

RESULTS

Eight out of the 20 patients (40%) implanted had a substantial reduction (60-100%) in their pain scores immediately after the insertion of the electrodes (insertional effect). When this occurred, patients were discharged with the DBS electrodes buried under the galea. Upon recurrence of the pain, they were brought to the hospital to be tested. The median time for the resurgence of pain in patients that experienced insertional effect was 3 months (ranging from 10 days to 18 months).

Seven out of the 20 patients (35%) initially implanted failed the postoperative stimulation trial and had their electrodes removed. One patient is still experiencing a prolonged insertional effect and has not been tested so far. Twelve (60%) patients had a successful stimulation trial and were implanted with an IPG. Of these 12 patients, 1 has been using his device for only 2 months and was excluded from the long-term analysis. Only 3 of the 11 patients left (27%) were still using their devices after the first year of treatment.

Of the 12 patients implanted with an IPG, 7 (58%) had an insertional effect. In contrast, only 1 out of the 7 (14%) patients that had their DBS electrodes explanted had an insertional effect ($p=0.02$). This shows that the development of an insertional effect may predict a short-term benefit. Due to the small number of patients using their DBS systems after the first post-operative year, we could not assess whether an insertional effect was a predictor of efficacy at long-term. Of the 3 patients that were still using their devices after the first year, 2 had an insertional effect and 1 did not.

CONCLUSIONS

The limited benefit of DBS in patients with deafferentation pain emphasizes the need for a better understanding of the pathophysiology of this condition for the development of novel treatment strategies.

Key words: Thalamus; DBS; PVG; Vc; Pain