

Deep Brain Stimulation of the posterior hypothalamus: indications , results and surgical technique

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Introduction: Patients treated with implantation of deep brain electrodes within the posterior hypothalamus for chronic cluster headache , SUNCT , neuropathic pain of the face and disruptive behaviour were retrospectively evaluated.

Methods: This series includes 26 patients treated between January 2000 and January 2004. Twenty patients were affected by chronic cluster headache unresponsive to medical and conservative treatment, one patient was affected by SUNCT, two by neuropathic pain due to trigeminal nerve peripheral damage, two patients underwent surgery to treat disruptive behaviour associated with epilepsy and perinatal brain damage, and one underwent hypothalamic stimulation for psychomotor agitation and drug resistant sleep disorders due to acute brain ischemia. Surgery was performed under local anaesthesia in pain patients and in general anaesthesia in the remnant cases. The stereotactic Leksell frame was used and the target was chosen according to the AC PC registered coordinates : X = +-2mm , Y = - 3 mm , Z = -5 mm. After the fifth operated patients a third anatomical landmark was added to the commissural system . The third point is the so called "interpeduncular point" at the apex of the interpeduncular cistern 8 mm below the commissural plane. Chronic stimulation by Medtronic quad electrodes was performed : 185 Hz , 60 us , 1-2Volts.

Results: Follow-up ranged between 6 and 48 months (mean 32 months). Outcomes were assessed

monitoring the periods free from pain bouts in cluster headache and SUNCT . VAS variations were monitored to assess the effects on neuropathic pain . The decrease of daily neuroleptics doses was chosen to assess the outcome in patients with behavioural disorders. Cluster headache patients obtained 82% increase of pain free days and complete withdrawal of steroids with return to normal life in all patients. SUNCT patient before surgery complained more than hundred pain paroxysms per day and now has only monthly sporadic pain episode . No modification of VAS and subjective pain was obtained in patients affected from neuropathic pain of the face. Complete withdrawal of neuroleptics and significative improving of social activities with disappearance of disruptive aggressive behaviour was obtained in the two patients with perinatal brain damage. The last patient with postischemic brain damage and psychomotor agitation obtained just a sleep normalization.

Conclusions. In our series there were no deaths, neurologic deficits, or infections. In one case electrode replacement was needed. The results in disruptive behaviour confirm the data of Sano who performed lesions in the posterior hypothalamus to treat aggressiveness in subaverage IQ patients. The results in cluster headache and SUNCT are stable at long term follow up while no significative result was obtained in neuropathic pain of the face. From a technical point of view it has to be remarked that a third mesencephalic anatomical landmark is necessary to extend the commissural reference system to our targeting area.