

SUPPLEMENTARY MATERIAL

Surgery

In all the cases a frameless stereotactic system were used. Frameless systems is considered by our group a reliable and accurate technique. In a previous study involving 110 patients undergoing deep brain stimulation (DBS) surgery we used the frameless stereotactic approach by combining preoperative magnetic resonance imaging and intraoperative microelectrode recordings (MER) to identify the final target position.¹ The subthalamic nucleus (STN) dorso-lateral part was selected as the definitive lead placement coordinates (final target [FT]) for bilateral deep brain stimulation (DBS) in all the cases. The anatomical coordinates for planning were derived using T2 and T1 volumetric images: X=12 mm lateral; Y=2 mm anterior; Z=4 mm ventral. Afterwards microrecording and macrostimulation allowed to recognise collateral effects that brought us to change lead's location.¹ In the present study, the frameless approach, namely the absence of the stereotactic frame, resulted very relevant as it allowed patients to perform the DBS-RTNT. The procedure involves first the hemisphere that controls the neurological worse side of the body. Then the FT is mirrored in the opposite hemisphere and refined by intraoperative monitoring. Patients received either a non-rechargeable or a rechargeable pulse generator of Medtronic® (Minneapolis, MN, USA), Boston Scientific® (Valencia, CA, USA), or St. Jude Medical® (Saint Paul, MN, USA) system according to the DBS expert team's clinical choice for the patient's specific needs.

Stimulation

Traditionally, in our center as well as in many other surgery units all over the world, the DBS procedure is performed under local anesthesia in order to allow intraoperative MER and microstimulation with concomitant clinical testing, carried out by a neurologist, for evaluating the improvement of motor symptoms and the occurrence of possible adverse effects.² During MER, as typical STN pattern, we look for bursting cells and a widening of background noise.³ Intraoperative micro stimulation is carried out at the beginning, in the middle and at the end of the typical STN signal in the track, which displays the richest cellular activity on MER. Intraoperative microstimulation is performed with microelectrode with the following parameters: 60 microseconds, 130 Hz and intensity up to 3 mA which resemble the parameters usually adopted during chronic stimulation. The permanent DBS electrode is implanted in this track unless test stimulation shows adverse effects (i.e. capsular effects). In this case, we select another track in order to find the one with the widest therapeutic window that is the lowest threshold of therapeutic benefit and the highest threshold of adverse effects.³

REFERENCES

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