GPI AND VIM DEEP BRAIN STIMULATION (DBS) WITH AND WITHOUT MICROELECTRODE RECORDING (MER): A COMPARISON FROM THE SAME CENTER

Dr Gorgulho Alessandra - A Gorgulho, L Tseng, E Benhke, S Krahl, C Mattozo - Neurosurgery Division - David Geffen School of Medicine - UCLA

INTRODUCTION: The rational for microelectrode recording (MER) in movement disorder surgery (MDS) is the achievement of better targeting that may lead to a better clinical outcome. There is controversy regarding the potential risks of this technique and the real benefits obtained. Movement disorder centers either use MER routinely or do not perform MER at all. At UCLA, the surgical team has experience with deep brain stimulator (DBS) implant surgery with and without MER, in conjunction with macroelectrophysiology. The purpose was to compare results and complications of DBS surgeries performed with and without MER.

MATERIALS AND METHODS: From January/1998 to August/2004, 264 DBS were implanted at UCLA. There were 142 DBS in the GPi/VIM/VPL. STN DBS were not analyzed since MER was used in all cases. There was complete postoperative data available for 86 procedures performed in 59 patients. There were 32M: 27F, mean age of 55 years (range: 12–87 years). Forty-nine (57%) DBS were implanted in the GPi, 35 (40.7%) in the VIM and 2 (2.3%) in the VPL. Thirty-four (39.5%) procedures were performed due to Parkinson Disease (PD), 28 (32.6%) due to Essential Tremor, 22 (25.6%) due to Dystonia and 2 (2.3%) due to Central Pain. The average disease duration was 17 years. Thirty-seven (43%) of the procedures involved MER. The mean age for the MER group was 49 years-old and 58.6 years-old for the no-MER group. Mean follow-up for the MER group was 16.48±12.6 months and 16.12±15.43 months for no-MER group.

RESULTS: Both groups matched regarding age (p=0.878), incidence of arterial hypertension (p=0.764) and type of implant (unilateral/bilateral, complete/staged). However duration of the disease prior to surgery was significantly longer in the no- MER group (p=0.012). Based on magnetic resonance imaging, the difference between the planning and the post-operative DBS placement in all three planes between MER-group and no-MER group was: dX=0.9 vs 1.7, dY=1.1 vs 1.7, dZ=1.4 vs 1.8. Mean three-dimensional deviation between planned and final target was 2.27±1.17mm for MER and 3.39±1.77mm for no-MER (p=0.035). Mean movements of the macroelectrode in the MER group was 1.05±1.82 and 0.75±1.26 for the no-MER group (p=0.37). The number of cases requiring intraoperative macroelectrode reposition based on macroeletrophysiology was 15 (40.54%) for MER and 18 (37%) for Macro (p=0.66). The extension of macroelectrode movements in the MER-group comparatively to the no-MER group was: X=0.5mm vs 0.4mm, Y=0.5mm vs 0.3mm, and Z=0.7mm vs 0.6mm. The two groups had similar lengths of post-operative hospitalization (MER mean = 2.56 days and non-MER mean = 2.71 days) and rehabilitation stay (MER mean = 0.9 days and non-MER mean = 0.8 days). Overall rate of brain lead repositioning in the series was 6.33%. It became necessary in 6 (12.24%) cases within no-MER group and none at the MER group (p=0.035). Complications in the MER-group and the non-MER group were: 3% vs 2% hemorrhages (p=1), 3% vs 2% erosions (p=1), 8% vs 6% infections (p=1). Hardware breakage occurred in 11% vs 8% in MER and no-MER, within a mean follow-up period of 12 months.

CONCLUSIONS: MER use provided a better anatomical accuracy in DBS placement and no repositioning of the brain lead later on was necessary so far. Even though the rate of complications was mildly higher in the MER group, the differences between the 2 groups were not significant. It seems that the preference of the

surgeons will continue to guide the decision whether to perform or not MER in movement disorder surgery.