**Localization of cortical electrodes**

All subjects underwent clinical pre-and post-operative imaging. Pre-operative imaging included T1-weighted magnetization prepared rapid acquisition gradient echo (MPRAGE) image (slice thickness = 1 mm, repetition time = 2100 ms, echo time, 2.98 ms, flip angle = 15º, 3T, Siemens Skyra). Before surgery, a Laksell stereotactic head frame (Elekta Instruments) was applied to the skull and a full head computed tomography (CT) scan was obtained using 1-mm slice thickness (Siemens Sensation 64). To anatomically localize the ECoG strip, we adopted the method described by Randazzo and colleagues1 (Figure 1).

Pre and post-operative CT scans (including stereotactic fiducials and DBS electrodes respectively) were co-registered to the pre-operative high resolution structural MRI using normalized mutual information criteria and resliced in the Statistical Parameter Mapping (SPM) toolbox (SPM12, http://www.fil.ion.ucl.ac.uk/) and visually inspected for accuracy. The cortical surface was reconstructed from the preoperative MPRAGE sequence MRI using Freesurfer (Figure 1A)2. A 3D surface of skull and stereotactic frame was rendered from co-registered pre-operative CT scan in the Osirix software3. DBS electrodes were reconstructed from co-registered post-operative CT scan as localized increases of signal intensity along every axial slice in the image. Stereotactic frame landmarks were also identified and marked on the co-registered pre-operative CT scan The 2D fluoroscopic image and 3D skull surface were visually inspected and fused using a custom made Matlab GUI and camera toolbox1. Reconstructed DBS leads and stereotactic frame landmarks were used to ensure maximal accuracy of 3D/2D fusion to the single-slice lateral fluoroscopy to localize ECoG strip Figure 1B). Finally, ECoG contacts were manually marked on the fused images and visualized on the reconstructed cortical surface (Figure 1C). We defined three bipolar contact pairs for analyses: CS (spanning the central sulcus), Post-CS (immediately posterior to CS), and Pre-CS (immediately anterior to CS) (Figure 1D).

**Bibliography**

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