THE EFFECT OF PROPOFOL AND FENTANYL ON MICROELECTRODE RECORDING AND ITS CLINICAL APPLICABILITY DURING SUBTHALAMIC NUCLEUS DEEP BRAIN STIMULATION SURGERY

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We investigated the influence of propofol and fentanyl on microelectrode recording (MER) and its clinical applicability during subthalamic nucleus (STN) deep brain stimulation (DBS) surgery. We analyzed 8 patients with Parkinson`s disease, underwent bilateral STN DBS with MER. Their left sides were done under awake and then their right sides were done with a continuous infusion of propofol and fentanyl under local anesthesia. The electrode position was evaluated by preoperative MRI and postoperative CT. The clinical outcomes were assessed at six months after surgery. We isolated single unit activities from the left and the right side MERs. There was no significant difference in the mean firing rate between the left side MERs (38.7±16.8 spikes/sec, n=78) and the right side MERs (35.5±17.2 spikes/sec, n=66). The bursting pattern of spikes was more frequently observed in the right STN than in the left STN. All the electrode positions were within the STNs on both sides and the off-time Unified Parkinson`s Disease Rating Scale part III scores at six months after surgery decreased by 67% of the preoperative level. In this study, a continuous infusion of propofol and fentanyl did not significantly interfere with the MER signals from the STN. The results of this study suggest that propofol and fentanyl can be used for STN DBS in patients with advanced Parkinson`s disease improving the overall experience of the patients.

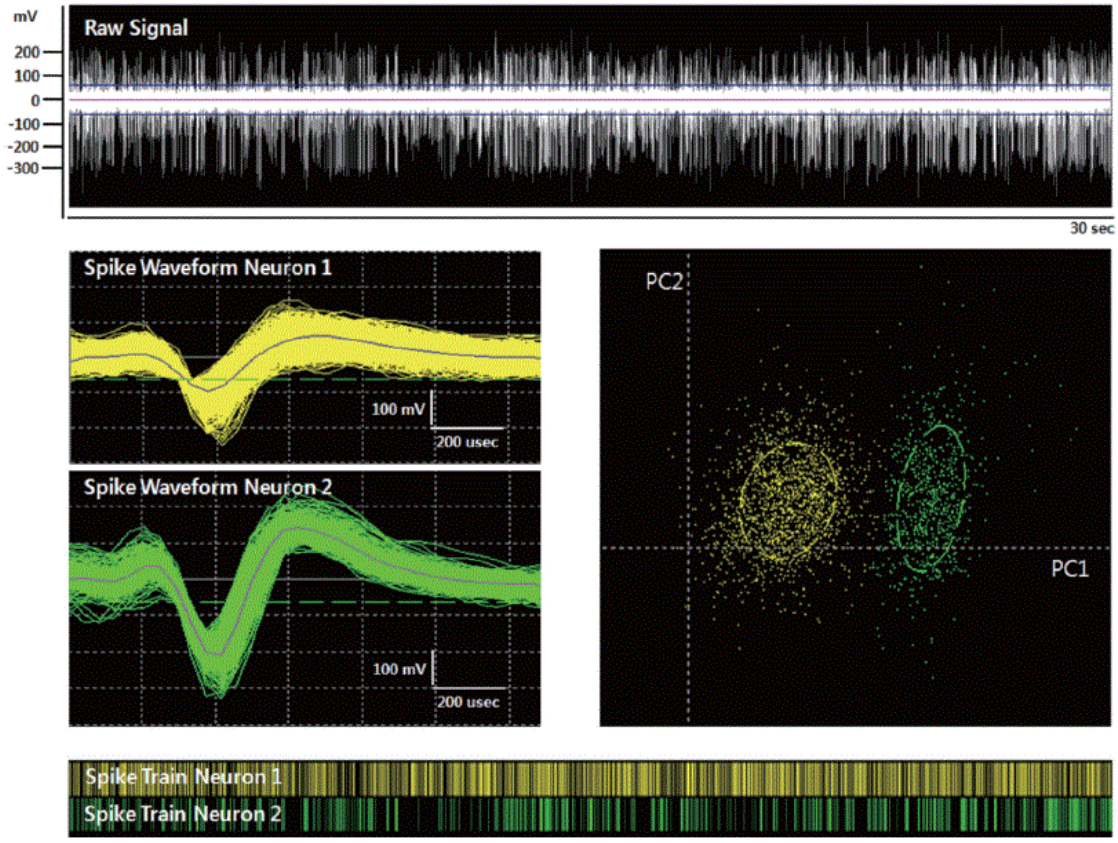

Fig. 1. A sorted single unit on microelectrode recording. This figure demonstrates a sorted single unit. The expectation-maximization algorithm was applied to raw signal (white) for getting isolated unit waveforms (green) from noise signal (yellow). Top, raw spiking activity; middle left, unit waveforms (green) and isolated form noise (yellow); middle right, isolated unit and noise on a principle component plot (x-axis, PC1;y-axis, PC2); bottom, raster trace of unit events (green) and noise events (yellow) over a selected time period.

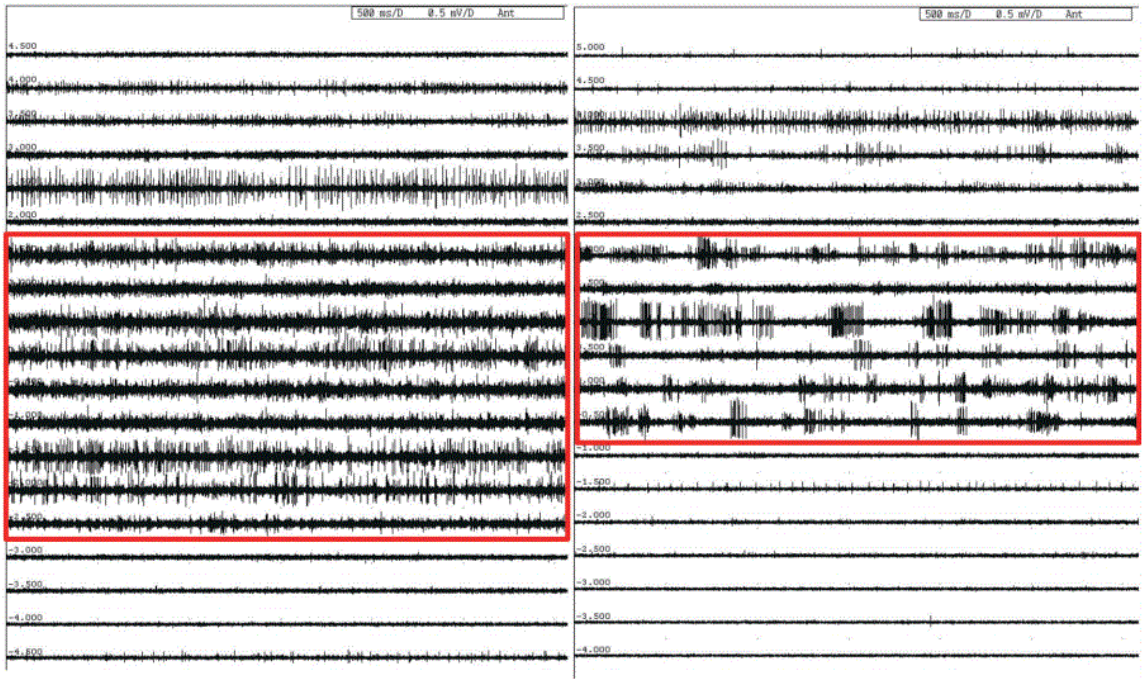

Fig. 3. Typical bursting patterns (see the boxes). The typical bursting patterns are demonstrated according to anesthetic methods. Left column, bursting pattern in LA; Right column, bursting pattern in MAC.