**Title:**

**Application of Electromyogram for Deep Brain Stimulation under General Anaesthesia**

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**Abstract**

**Objective:**

Traditionally, Deep Brain Stimulation (DBS) for treatment of Parkinson’s Disease (PD) is done under awake surgery to aid accuracy of lead implantation and side effect testing. However, DBS done under awake surgery requires a highly cooperative patient, and the pre-operative halt of L-Dopa medication may cause significant stress to the patient. With the recent advancement in technology, there has been a push towards the completion of DBS surgery under general anaesthesia (GA). In our centre, we are advocating for the transition of awake to GA-based DBS surgery, involving the use of Electromyogram (EMG) to test for motor side effects.

We hypothesize that EMG can be used in a GA setting for the detection of muscle contractions, and subsequently predict the corresponding clinical stimulation side effect threshold.

**Methods:**

We retrospectively examined the clinical data of 57 PD patients (114 leads) who underwent DBS Surgery of the subthalamic nucleus. The intra-operative threshold needed to induce contralateral limb muscle contraction was correlated with the 1st programming post-operative threshold needed to elicit clinical side effects. Descriptive statistics and T-test were completed.

**Results:**

In this cohort, the mean voltage needed to induce limb muscle contraction intra-operatively was 4.623 ± 1.209mV. Post-operatively, the threshold needed to induce clinical side effects was 3.912 ± 0.951mV. The post-op side effect threshold was consistent above 2.5mV, with a p-value of 0.00.

**Conclusion:**

Our results indicates that EMG is indeed a valuable tool in predicting post-operative clinical stimulation side effect threshold, and can be used as an adjunct for the targeting accuracy in GA-based DBS surgeries.