Deep Brain Stimulation for Essential Tremor Refractory to Thalamotomy

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Recommended Citation
Deep Brain Stimulation (DBS) is an accepted treatment for many psychiatric and neurologic disorders, including essential tremor. The procedure has some distinct advantages over traditional surgical ablative procedures such as thalamotomy and pallidotomy in that it is adjustable, reversible, and no tissue is destroyed in the process. The implanted device consists of three components: 1) intracranial electrodes, 2) a single or dual chamber programmable internal pulse generator (IPG) with battery, and 3) an extension cable that connects the two. The implantation procedure itself is staged with the first portion, "awake brain surgery," involving placement of the electrodes in the target area of the brain and subcutaneous tunneling of the extension cable from the electrodes to the site of the IPG. The second stage, usually a separate procedure from the first, involves implanting the IPG device into the infraclavicular area.1

The ideal agents should not interfere with microelectrode recording and should have either no effect or an easily reversible effect on subcortical neuronal activity. While the surgery can be accomplished with either MAC or general anesthesia, MAC is preferred and offers a few advantages over general. MAC allows clinical symptoms like tremors to be evaluated during surgery as certain brain structures are stimulated by the microelectrodes. MAC also allows better control of patient hemodynamics which is important since hypertension leading to intracerebral hemorrhage is a potential complication of the procedure. Benzodiazepines and high-dose opioids interfere with microelectrode recording during stimulation testing, as subcortical areas are sensitive to GABA medications. Short-acting opioids, however, have little effect on microelectrode recording.2 During our case, we employed a combination of dexmedetomidine and propofol which were titrated to effect before incision and weaned off prior to anticipated wake-up. While awake, patient was asked to complete tasks as microelectrodes stimulated the ventral intermediate thalamus of the nucleus which is sensitive to GABA medications. Short-acting opioids like remifentanyl and the alpha-2 adrenergic agonist dexmedetomidine are good choices as neither will affect microelectrode recording. Propofol can also be used for portions of the procedure but should be appropriately timed to stop before the macrostimulation phase of said electrodes so that they can be appropriately placed for treatment. Short-acting opioids like remifentanyl and the alpha-2 adrenergic agonist dexmedetomidine are good choices as neither will affect microelectrode recording. Propofol can also be used for portions of the procedure but should be appropriately timed to stop before the macrostimulation phase.

Anesthesia for DBS presents a challenge for anesthesiologists as patients must be appropriately sedated to comfortably undergo placement of intracranial electrodes but must also be easy to arouse for the macrostimulation phase of said electrodes so that they can be appropriately placed for treatment. Short-acting opioids like remifentanyl and the alpha-2 adrenergic agonist dexmedetomidine are good choices as neither will affect microelectrode recording. Propofol can also be used for portions of the procedure but should be appropriately timed to stop before the macrostimulation phase.

REFERENCES