

Deep Brain Stimulation Surgery Instructions

Dr. Nandan Lad

Schedule

- 1. Planning for surgery:** Outpatient fMRI imaging and pre-op appointment
MRI Date and Time:
Pre-op appointment Date and Time:
- 2. Day before surgery:** Outpatient fiducial insertion and CT
Anchor implantation and CT scan Date and Time:
Fiducial placement:
CT:
- 3. Stage 1 of surgery:** Inpatient DBS electrode mapping and lead insertion
Date and Time:
- 4. Stage 2 of surgery:** Outpatient IPG (generator) implantation and electrode hookup
Date and Time:
- 5. Post-Op Visit**
Date and Time:
- 6. 2-4 weeks after surgery:** Initial programming of implant with neurologist
*Date and Time: **Contact Dr. Hickey's office for this appointment***

Pre-Operative Instructions for Stage 1 and Stage 2 of surgery

-Do not eat or drink anything after midnight the evening before your surgery. This includes water, coffee, chewing gum and mints.

-Eat a light meal in the evening: no fried or greasy foods and no alcohol. You can brush your teeth in the morning.

-The following medications should be discontinued prior to your surgery:

- Blood thinners (anticoagulants). These include: Coumadin, Ticlid, Plavix, and Lovenox. Please contact your primary doctor (PCP) or the prescribing physician to ask how this medication should be discontinued. It will have to be discontinued at least 1 week before surgery and all lab values that show us how thin your blood is have to be in the normal range before your surgery. **Notify our office if you will not be stopping your anticoagulant.**
- Aspirin and Ibuprofen need to be stopped 7 days prior to the first surgery and you should not restart taking them until after the IPG has been implanted.
- Herbal supplements (fish oil, garlic, ginseng, ginkgo biloba, vitamin E, Echinacea, kava, St. John's Wort and ephedra) should be stopped 2-3 weeks prior to your first surgery
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-There are many more medications that should be stopped – if you are unsure, please contact us.

-Tylenol and Celebrex are ok to continue.

-The following medications should be taken with a sip of water on the day of surgery, if you take a morning dose:

- Anti-seizure medications including: Dilantin, Tegretol, Lamictal, Phenobarbital, and Depakote
- Heart/blood pressure medications, including Digoxin, HCTZ, Verapamil, Cardizem, Lopressor, Norvasc, metoprolol and labetalol
- Thyroid medication
- Asthma medication (please bring this to the hospital with you)
- Reflux medication

If you are ill, please call our office at 919-681-4986 and let us know

1. Planning for surgery

- **MRI**

The purpose of the MRI scan is to acquire accurate and precise images used by Dr. Lad to plan the optimal target and pathway for the DBS electrode to be placed in your brain. The MRI is many times done with sedation and, if this is the case for you, then you will need someone to give you a ride home from the hospital after the MRI. The MRI scan can be done up to one month prior to the bone anchor placement.

Please arrive at the hospital 30 min before the time of your scheduled MRI. You will need to check in at Duke Hospital Radiology. This is located on the first floor of Duke Hospital on Erwin Road.

- **Pre-operative History and Physical**

The purpose:

A pre-operative risk assessment is necessary for most surgeries to make sure that you are healthy enough for the procedure that you are about to undergo. This appointment will be scheduled for you and will be shown in the appointment dates at the beginning of this letter. This will take place in Clinic 2D in the same building where you had your original appointment with Dr. Lad.

Depending on your health history, we may require a letter of clearance from another specialist (cardiologist, pulmonologist, etc.).

2. Day before surgery: Placement of fiducials and CT scan

Arrival at the Hospital:

You will need to arrive in Clinic 1B/1C 30 min before your scheduled appointment time.

Placement of the fiducials:

The bone anchors are placed in a minor procedure room. Five to six small, stainless steel anchors will be placed into your skull through a small incision (less than a 1/4 of an inch) in the scalp. These will be toward the top of your head and should not interfere with you being able to lay your head down to sleep at night.

CT scan:

After the fiducial placement you will go directly to the radiology department to get a CT scan. After the CT scan is finished, you will be free to go home. The CT and MRI scans are used by your neurosurgeon to create a customized surgical plan for placing the DBS electrode(s).

Post-Operative Instructions:

- Gently wipe your scalp with a damp washcloth for general cleaning. Do not apply any ointments or creams. Do not get your head soaking wet! If you shower, use a shower cap to keep the incision/staple sites dry.
- You can wear a loose hat, scarf or turban when you go outside, but it is best to leave your incisions open to air as often as possible.
- For sleeping, any soft pillow should do.
- Tylenol is recommended for any mild discomfort that you experience during this time.
- Call our office if you develop a fever of 101.5 or higher or if you have any more than slight redness, swelling or drainage from the bone marker insertion sites.
- You may have some oozing of blood from the incision sites, especially right after the procedure. Applying firm pressure with a sterile gauze pad or clean washcloth for approximately 5- 10 minutes can stop this bleeding. In the unlikely event you are unable to stop the bleeding, go to the emergency room.

1. Stage 1 of surgery: Stereotactic Mapping of the Target and DBS Electrode Implants

Pre- Operative Instructions:

STOP ANTI-PARKINSON'S MEDICATIONS OR THOSE USED FOR TREMOR BY MIDNIGHT THE EVENING BEFORE SURGERY.

See above Pre-Operative Instructions on Page 2.

Arrival at the Hospital:

You need to arrive at the pre-operative holding area on the 3rd floor of Duke Hospital at 5:30 am. Your surgery is scheduled to be the first case of the day, so it is very important that you arrive on time. Your family may stay with you until you actually go to the operating room.

Surgery typically lasts until about 2 PM. However, this is an average and your surgery may end earlier or later. The OR nurses will call the surgical waiting area to let your family know when we begin surgery, approximately 2 hours after that, when we are between sides, and when we are closing.

In the Operating Room:

There are numerous people that will be involved in your surgery and are part of the surgical team: the neurosurgeon and assistants, the anesthesiologist, a neurologist, and technical support staff. Please be assured that all members of the team work together routinely to ensure the safety and success of your surgery. You will be positioned on the operating room table in a reclined position and will be made as comfortable as possible. Various pieces of equipment will be attached to your body, including EKG leads, a blood pressure cuff and a pulse oximeter on your finger. These items help the nurses and anesthesiologist monitor your vital signs. Since you will be unable to leave the operating room to go to them bathroom, a Foley catheter will be inserted into your bladder to drain your bladder during the surgery. Your head will be cleansed and draped with sterile sheets. A local anesthetic will be injected to numb your scalp so that you will not feel pain with the incisions. If adequately numbed, the remaining procedure is not painful, since there is no significant pain perceived below the scalp. Bone and brain tissue do not sense pain. A small, dime-sized hole will be made in the skull. The neurosurgeon will insert a test electrode deep into the brain through the planned target area. We will observe what effect the test stimulation has on your movement, and whether there are any side effects from the stimulation. When the stimulator is turned on, your surgeon and neurologist will evaluate the lead location and stimulation strength by asking you to perform simple tasks, such as touching your fingers together or moving your wrist. Your speech will be evaluated along with sensations such as numbness and tingling. Once the desired responses are obtained, the test electrodes will be removed and the final location for the implant will be determined. The permanent electrode implant will then be placed precisely into the optimal location. The electrode implant will be secured and the incision closed. If you are doing well and there have not been any complications, the other side will be done, following the same set of

steps. The entire operating room procedure takes between 4-6 hours. The bone anchors will be removed after surgery. You may feel tired or become restless after lying in one position for so long. The staff will do their best to make you comfortable.

Post-Operative Information – What happens while you are still in the hospital

Once the surgery is complete, you will go to the recovery room and Dr. Lad will talk to your family at this time. Sometime later in that day, you will be taken for a CT scan, which will document the electrode placement and will also check for any evidence of bleeding or a stroke. You will spend the night in the neurosurgical ICU on the 4th floor of Duke Hospital.

If all is well on the morning after surgery, you will be transferred to a regular room in the hospital. It is normal to have some headache. While the nurses will occasionally ask you about your pain level, please do not hesitate to request medication if you need it.

You will get out of bed and you may be seen by the physical and occupational therapists. Dr. Hickey may come by to check on you as well.

Patients are generally discharged 1-3 days following surgery.

Post- Operative Instructions:

- Resume taking your anti-Parkinson's medications as before. Keep wounds dry for 5 days. You can then shower and get your head wet AFTER 5 days. Do not apply any ointments or creams.
- Call our office if you experience a fever of 101.5 or higher; drainage from the incision; new weakness developing in your arms or legs; difficulty being aroused from sleep by your family/friends; or a persistent headache not relieved by medication. Call your neurologist for any changes related to movement or for questions about your medications.
- Take your antibiotic and/or pain medication as directed.

What to Expect During the Recovery Period:

Sometimes air is introduced around the brain when the lining of the brain (the dura) is pierced to insert the DBS probe. Subsequently, you may experience a headache over your forehead, which will go away as the air is reabsorbed. Changes in behavior such as sleepiness, fatigue, difficulty with speech, and/or confusion may temporarily be seen for up to 4-6 weeks. Occasionally the surgery can make the dyskinesias become temporarily worse. This, too, will resolve with time. Often times the passage of the DBS probes through the brain tissue "stuns" the nerve cells and produces a "honeymoon" effect, whereby you will experience improved symptoms for several days similar to what you may expect once your internal pulse generators have been programmed. Sometimes fluid that accumulates under the scalp during the surgery will shift down the scalp and be noticeable as it is being reabsorbed over several days following the surgery. Patients often notice a swollen forehead or swollen eyes around the second to fourth day after the surgery. This is normal and should go away as the fluid is being reabsorbed within the first week after this surgery.

2. Stage 2 of surgery: DBS Generator (IPG) Implant and Electrode Hook- Up

Pre- Operative Instructions:

Please see the pre-operative instructions on page 2.

You may take your anti-Parkinson's, tremor or dystonia medications with a sip of water in the morning if that is your scheduled medication time.

Arrival at the Hospital:

You need to arrive at the pre-operative holding area on the 3rd floor of Duke Hospital. If you are not the first patient of the day, please be aware that these times are only approximate and that sometimes events occur faster or slower than expected. Your family may stay with you until you actually go to the operating room.

During the Procedure:

For this operation, you will be given general anesthesia and be asleep. The surgery takes approximately 1-2 hours. The internal pulse generator (IPG) will typically be implanted in the upper chest region, below your collarbone. Most people need only one IPG, but some patients may require two. Special positioning of the IPG or certain medical conditions may require a different location of the IPG, and this will be discussed by your surgeon prior to the surgery. An extension wire is used to connect the DBS electrode to the IPG. It is threaded under your skin from the top of your head, behind the ear, to the IPG. The incision in your chest will be closed with stitches that dissolve. The outer skin is stapled or sutured. These will be removed at your follow up visit 10-14 days after surgery.

After your neurosurgeon has finished your surgery, you will be taken to the Recovery Room and Dr. Lad will, once again, speak with your family in the waiting area. From the Recovery Room you will be discharged. You are typically discharged 2-3 hours after your surgery is complete, but it may be necessary for you to spend the night.

Post-Operative Instructions:

- Keep your dressing on for two days, and keep your wounds dry for 5 days. Then you can shower as usual. Just keep the incisions clean and dry.
- Call our office immediately if you have a fever of 101.5 degrees or higher, or if you develop any redness that spreads out like a sunburn, swelling, or drainage from your incisions.
- A post-op surgery check and staple removal will be scheduled for 10-14 days following surgery.
- It is normal to have some head, neck and chest soreness after placement of the battery. We will provide you with pain medication for this.

3. Post-Operative Appointment

You will return to see Dr. Lad in Clinic 1B/1C approximately 10-14 days after the IPG is implanted. At that time we will discuss how you are doing and we will also remove any staples or suture that needs to be removed.

4. 2-4 Weeks after Surgery: Programming of Stimulator

During this visit the neurologist will test the implanted device to make sure that it is working properly. Each of the four contacts on the implanted lead(s) will be tested for symptom benefit and possible side effects. The purpose of this visit is to determine which of the four contacts offers the best symptom benefit. At the conclusion of this visit, the neurologist will provide instructions concerning the use of the patient programmer, medications and stimulation. IPG's can be replaced as needed, with the battery life lasting generally about 3-7 years. Follow-up visits will occur every one to two months for the first six to 12 months, and then as needed.

You will schedule these appointments with Dr. Hickey.

Very Important. Please Read Carefully.

After You Receive Your Implant

Always carry your identification card! Your internal pulse generator may set off metal detectors.

Dental drills ultrasonic probes - turn OFF the neurostimulator. Ask your dentist to keep the drill or probe 6" away from the neurostimulator.

Dental Work after DBS. We recommend avoiding routine dental prophylaxis and simple procedures for 3 months following a stimulator placement, but between 4 and 24 months we suggest antibiotic prophylaxis. After this time frame you should consult with your Primary Care Physician about your need for antibiotic prophylaxis.

Deep Heat Therapy - Never have any diathermy!

Lithotripsy (a treatment for kidney stones) is not recommended for patients with an implanted neurostimulation system, as it can damage the circuitry.

Scuba Diving - patients should not dive below 33 feet of water.

Tens Units - do not place TENS electrodes so that the TENS current passes over any part of the neurostimulation system.

MRI Examinations - you can no longer undergo a full body MRI examination. If your doctor orders an MRI of the head, inform the x-ray staff about your implant. Imaging centers have very specific protocols for imaging stimulator systems **THAT MUST BE FOLLOWED**. Be sure to turn off your pulse generator before the procedure. During the examination, immediately inform the x-ray technician if you experience any heat in your head, neck or chest; pain; shocking sensations/uncomfortable stimulation; or unusual sensations. Your examination will most likely be stopped. These symptoms occur very rarely. You may turn on your IPG after the MRI exam is finished. If you suspect that your settings have been changed, contact your neurologist.

VISITOR INFORMATION

Visitors play an important role in helping patients recover. The following policy outlines guidelines for visiting inpatients and outpatients:

- Your family will be allowed to stay with you in the pre-operative area until you go into the operating room.
- All visitors must have a visitor pass, available at all information desks.
- You will not be allowed to have visitors in the recovery room
- General visiting hours are from 11:00 a.m. to 9:00 p.m.
- The Neurosurgical ICU is located on the 4th floor of Duke Hospital
- The Neurosurgical patient floor is located on the 4th floor of Duke Hospital
- A maximum of 2 visitors at a time may visit with a patient in the intensive care unit (ICU)
- Visitors under 12 years of age must be in the company of a responsible adult. Children under six years of age must be free from communicable disease and current with vaccinations
- Duke has negotiated discounted room rates at hotels near the hospital. We have included a listing of accommodation possibilities for you in this patient packet.