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PATIENT GUIDE

Surgical options for Parkinson's disease: my guide for patients

Who should consider surgery, and how deep brain stimulation and focused ultrasound compare.

AT A GLANCE

First step	Medications, most often Sinemet (carbidopa/levodopa)
Consider surgery	When medications cause problems or stop working well, and movement symptoms interfere with daily life
Most common surgery	Deep brain stimulation (DBS)
Focused ultrasound	Treats tremor only, and is not covered by insurance for Parkinson's
Testing for DBS	Neuropsychological exam and a levodopa sensitivity test
Age limit	None; your overall health matters more
DBS insurance coverage	Almost always covered, and my office obtains pre-authorization first

This information is intended as a general guide for my patients, and if you are seeing a different neurosurgeon, it should not substitute for advice, guidance, or instructions from that surgeon.

Introduction

Parkinson's Disease (PD) is a neurologic disorder that results from a gradual loss of nerve cells in the brain that produce a chemical called dopamine. We do not know what causes these nerve cells to disappear, but the loss of dopamine within the brain causes a variety of symptoms related to movement, including tremor, stiffness, slowness, and trouble with gait and balance. Patients with Parkinson's often also have other symptoms that are not related to movement: loss of sense of smell, trouble with sleep, constipation, dizziness, and others. Symptoms are progressive, meaning that they worsen over time.

Treatment for Parkinson's often begins with replacing dopamine using medications, the most common being Sinemet (carbidopa/levodopa). For patients who develop problems with medications or whose symptoms stop responding to medications, surgery should be considered.

What are the surgical options for Parkinson's?

For the past 20+ years, the most common and effective surgery for PD in the United States has been deep brain stimulation (DBS). DBS involves inserting one or two millimeter-thin wires into the brain. These wires deliver targeted, painless pulses of electricity that disrupt the abnormal brain rhythms that contribute to the movement symptoms of PD. The wires run under the skin and are connected to a small battery that is implanted under the collarbone, similar to a pacemaker. DBS has a number of benefits for patients with PD, described in more detail below.

Recently, several procedures using MRI-guided focused ultrasound were approved by the US Food and Drug Administration (FDA) for treating PD. These procedures do not require a brain implant or hospital stay, but they are currently limited in use, in part because **they are not covered by any insurance company (including Medicare) for PD, and they do not provide the same benefits as DBS**.

I perform both DBS and focused ultrasound. Additional information on the benefits of DBS versus focused ultrasound is provided below.

Who should consider surgery for Parkinson's?

You should consider surgery for PD if all of the following are true:

1. A neurologist has diagnosed you with PD.
2. You have problems such as needing to dose your medications frequently during the day, dyskinesias (uncontrolled writhing or spasms), or bothersome tremor or dystonia despite medications.
3. Your movement symptoms interfere with your daily activities.
4. You have reasonable general health and do not have signs of dementia.

What are the benefits of DBS for PD?

DBS has been studied in a number of randomized, controlled trials, the gold standard in medicine. These trials have established the following benefits:

- Improvement in tremor, stiffness, slowness, and other movement symptoms.
- More time per day at your best level of movement function (4-5 extra hours).
- Reduction in your medication doses.
- Improvement in your ability to perform everyday tasks.

- Improvement in your quality of life.

Which of my PD symptoms can I expect to improve with DBS?

DBS is effective for improving the movement symptoms of PD (tremor, stiffness, etc.). It is not effective for non-movement symptoms like sleep problems, constipation, dizziness, etc.

A good rule of thumb is that the PD symptoms that improve with Sinemet (carbidopa/levodopa) will likely also improve with DBS. An exception to this rule is tremor, which almost always improves with DBS, even if it is no longer helped by medications.

What are the benefits of focused ultrasound for PD?

Focused ultrasound was developed first as a type of thalamotomy for patients with a disorder called Essential Tremor (ET), but it has also been shown to be effective for the tremor in PD. Thalamotomy involves creating a tiny, targeted lesion (injury) in the brain using ultrasound waves. Focused ultrasound thalamotomy is helpful for the tremor in Parkinson's, but it treats only tremor, not other movement symptoms (unlike DBS, which treats many movement symptoms of PD).

There is also a newer focused ultrasound procedure for PD that was approved by the FDA in 2025, pallidothalamic tractotomy, that is intended to treat more than just the tremor in PD, but it has not yet been studied extensively.

Importantly, both focused ultrasound thalamotomy and pallidothalamic tractotomy are not yet covered by insurance for PD (including Medicare, in Colorado). Thalamotomy is covered by most insurers for Essential Tremor, and Medicare and other payors will probably follow this example for PD in the coming years.

Which procedure is better for my PD: DBS or focused ultrasound?

Setting aside for a moment the issue of insurance coverage, most patients with PD will have a better outcome with DBS than with focused ultrasound. There are a few reasons for this:

- DBS helps with many movement symptoms and has a long track record of effectiveness and safety.
- Focused ultrasound thalamotomy helps only with tremor, and pallidothalamic tractotomy has not yet been studied extensively.
- DBS is both adjustable and reversible. Your PD symptoms change over time, and DBS can be adjusted accordingly. Focused ultrasound creates a one-time lesion in the brain that is not adjustable or reversible.
- DBS allows for treatment of both sides of the brain and body at the same time in most cases. Focused ultrasound can only be performed one side at a time, with a minimum of 9 months in between sides.
- Focused ultrasound in general tends to have many more side effects than DBS.

Do I need testing to confirm I am a candidate for surgery?

Yes. There is careful testing to make sure that DBS is safe and appropriate for you, including a neuropsychological exam and a levodopa sensitivity challenge.

Neuropsychological exam

The neuropsychological exam involves a meeting with a specialized psychologist who will perform a detailed cognitive and emotional evaluation. The purpose of this exam is to screen for signs of dementia related to PD as well as for untreated psychiatric disorders that might affect DBS. If you have not had this exam, I will arrange for one.

Levodopa sensitivity test

I will also arrange for a levodopa sensitivity test (also known as an ON-OFF test) before DBS. This involves a brief exam with a neurologist or physical therapist when you have not taken your PD medications and again after you have taken them. The purpose is to confirm that the medications indeed help your movement symptoms. As a reminder, the best predictor of a good response to DBS is sensitivity to medications like Sinemet.

CT scan before focused ultrasound

Before focused ultrasound, a special CT scan of your brain is required. The CT scan evaluates the density of your skull to confirm that the ultrasound waves will penetrate it and reach the target in the brain. Roughly 30% of patients have skull densities that are too low; these patients are not candidates for focused ultrasound.

Is there an age limit for surgery?

No. Your overall physical health and your performance on the neuropsychological exam matter much more than your age.

What are possible side effects of these procedures?

Significant side effects are possible but not common after DBS. The main side effect I highlight to patients is a possible temporary period of confusion immediately after surgery. This may take a few days to a week to resolve. Studies have also documented subtle, long-term changes in cognitive measures including verbal fluency after DBS, but in my experience this is rarely noticeable to patients (provided they are chosen carefully). Most other side effects of DBS can be minimized with adjustments to the device settings.

Side effects are common in the first few weeks after focused ultrasound. Possible side effects include headache, trouble with balance or coordination, slurring of speech, changes in sense of taste, and tingling, numbness, coordination changes, or weakness in part of the body. Most of these side effects improve or resolve over time, but a small percentage of patients may have one or more of these long-term. Although focused ultrasound is advertised as being less invasive than DBS, my experience is that these side effects are much more profound than those seen with DBS, and patients usually underestimate them.

Will the procedure be covered by my insurance?

DBS is (almost) always covered, regardless of your carrier or policy. My office will obtain a pre-authorization from your insurance company to confirm that it will be covered before we schedule your surgery. The actual cost to you depends on the particulars of your insurance plan (i.e. your policy's out-of-pocket or deductible).

As discussed above, focused ultrasound is not currently covered by insurance for Parkinson's, only for essential tremor.

Where can I learn more?

Posted on my website are both a DBS patient guide and a focused ultrasound patient guide. These guides review how to prepare for surgery, what to expect after, and more. My website is also an excellent resource for patients wanting to learn more about PD and the procedures I perform. Here is a list of relevant pages from the site:

- Parkinson's Disease
- Deep Brain Stimulation
- Deep Brain Stimulation: my guide for patients
- Focused Ultrasound
- Focused Ultrasound: my guide for patients

If you live near Denver and have Parkinson's disease, please consider meeting me in consultation to learn about your treatment options.