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For some, deep brain stimulation brings lasting improvement in neuropathic pain

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For many patients with difficult-to-treat neuropathic pain, deep brain stimulation (DBS) can lead to long-term improvement in pain scores and other outcomes, according to a study in the February issue of *Neurosurgery*.

About two-thirds of eligible patients who undergo DBS achieve significant and lasting benefits in terms of pain, quality of life, and overall health, according to the report by Sandra G.J. Boccard, PhD, and colleagues of University of Oxford, led by Tipu Aziz FMedSci and Alex Green, MD. Some outcomes show continued improvement after the first year, according to the new report, which is one of the largest studies of DBS for neuropathic pain performed to date.

Most Patients Benefit from DBS for Neuropathic Pain

The authors reviewed their 12-year experience with DBS for neuropathic pain. Neuropathic pain is a common and difficult-to-treat type of pain caused by nerve damage, seen in patients with trauma, diabetes, and other conditions. Phantom limb pain after amputation is an example of neuropathic pain.

In DBS, a small electrode is surgically placed in a precise location in the brain. A mild electrical current is delivered to stimulate that area of the brain, with the goal of interrupting abnormal activity. Deep brain

stimulation has become a standard and effective treatment for movement disorders such as Parkinson's disease. Although DBS has also been used to treat various types of chronic pain, its role in patients with neuropathic pain remains unclear.

Between 1999 and 2011, that authors' program evaluated 197 patients with chronic neuropathic pain for eligibility for DBS. Of these, 85 patients proceeded to DBS treatment. The remaining patients did not receive DBS—most commonly because they were unable to secure funding from the U.K. National Health Service or decided not to undergo electrode placement surgery.

The patients who underwent DBS were 60 men and 25 women, average age 52 years. Stroke was the most common cause of neuropathic pain, followed by head and face pain, spinal disease, amputation, and injury to nerves from the upper spinal cord (brachial plexus).

In 74 patients, a trial of DBS produced sufficient pain relief to proceed with implantation of an electrical pulse generator. Of 59 patients with sufficient follow-up data, 39 had significant improvement in their overall health status up to four years later. Thus, 66 percent of patients "gained benefit and efficacy" by undergoing DBS.

Benefits Vary by Cause; Some Outcomes Improve with Time

The benefits of DBS varied for patients with different causes of neuropathic pain. Treatment was beneficial for 89 percent for patients with amputation and 70 percent of those with stroke, compared to 50 percent of those with brachial plexus injury.

On average, scores on a 10-point pain scale (with 10 indicating the most

severe pain) decreased from about 8 to 4 within the first three months, remaining about the same with longer follow-up. Continued follow-up in a small number of patients suggested further improvement in other outcomes, including quality-of-life scores.

Deep brain stimulation has long been regarded as potentially useful for patients with severe neuropathic pain that is not relieved by other treatments. However, because of the difficulties of performing studies of this highly specialized treatment, there has been relatively little research to confirm its benefits; only about 1,500 patients have been treated worldwide. The new study—accounting for about five percent of all reported patients—used up-to-date DBS technologies, imaging, and surgical techniques.

Dr. Boccard and coauthors acknowledge some important limitations of their study—especially the lack of complete patient follow-up. However, they believe their experience is sufficiently encouraging to warrant additional studies, especially with continued advances in stimulation approaches and technology. The researchers conclude, "Clinical trials retaining patients in long-term follow-up are desirable to confirm findings from prospectively assessed case series."

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