

# COMMENTARIES

## DBS

Psychosurgery is making a comeback. While this may sound frightening, it is not. Put into context, it is actually a wonderful example of progress, but it does bring with it a substantial implicit threat. I think this latter aspect has not yet been grasped by the medical community.

**Deep brain stimulation (DBS)** refers to a treatment for a very limited number of brain disorders in which an electronic stimulator, similar to a cardiac pacemaker, stimulates an extremely tiny region in the brain. DBS has replaced "otomies," the creation of a surgical hole in the brain, because of its enhanced safety and efficacy. Although thalamotomies were pioneered in the 1950s to treat Parkinson's disease, they were abandoned within a decade or so for several reasons. Probably the most important was the development of L-Dopa, but the procedure was often unsuccessful, sometimes resulting in substantial morbidity. Furthermore it did not generally result in substantially improved function even when successful. One problem was that imaging was crude. The only landmarks for surgery came from ventriculograms, plane skull x-rays that were taken after all the patient's spinal fluid had been removed and stereotactic harnesses. In the brain, where millimeter errors may be disastrous, this procedure was often off by a centimeter, a situation often worse than amputating the wrong limb. Thalamotomy was helpful only for reducing tremor. For most PD patients however, tremor, while bothersome, is more of an annoyance than a disabling symptom. When the tremor improved, functional disability often did not. Since 20% of bilateral cases became permanently mute, the trade-off seemed clearly not worthwhile once L-Dopa came on the scene. It should be recalled that thalamotomy became popular as the popularity of frontal lobotomies began to wane. Unlike thalamotomy, the lobotomy procedure represents a terrible, dark stain on the history of modern medicine which those of us involved in brain medicine must never forget. This "cure" for schizophrenia demonstrates what may happen when a converted few lose objectivity and a host of willing believers subvert their disbelief in the hopes that their own eyes deceived them.

For 20 years "functional" neurosurgery

remained relatively quiescent. Then pallidotomies (small lesions in the globus pallidus) were reintroduced after a long hiatus, and were demonstrated to probably be very effective for a limited number of PD patients. Electrical stimulation however offered the possibility of creating "reversible" lesions, lesions that could be altered by adjusting the electrical circuits within the brain through electric currents without requiring further surgery. The safety of the procedure allowed further experimentation leading to the now preferred (in the U.S.) location for the electrode in the subthalamic nucleus. Blinded trials have demonstrated the benefits of the surgery when the subjects are appropriately chosen. The procedure is approved by Medicare and other insurers and is now considered mainstream medicine. In the course of stimulator adjustments, millimeter abnormalities of placement, and biological variation, it has become apparent that mood can be altered with the stimulation. Some patients become hypomanic or fully manic with stimulator placement, even before the stimulator is turned on. Other patients may experience full-blown severe depressive episodes within seconds of a stimulator adjustment, with full recovery after stimulator readjustment.

Enter the world now of behavioral modification. Patients suffering from refractory devastating **obsessive compulsive disorders (OCD)** have improved with anterior capsulotomies, that is, psychosurgery. Patients who couldn't take a step because of OCD, who would defecate on themselves because their OCD prevented them from getting to the toilet, who failed every medication, who understood their predicament but couldn't overcome it, experienced life-restoring improvements (one of which I was lucky to have observed) with such surgery. The surgery itself had, of course, been subject to close peer review and **institutional review board (IRB)** oversight. As DBS techniques improved for treating PD, it began to be used experimentally in OCD, with great success and with the promise of reduced morbidity. If the benefits of DBS in OCD hold up it will represent a major advance in the treatment of a very small number of severely disturbed patients, restoring them, perhaps, not to normality, but at least to greater func-

tionality and improved quality of life.

Now we must face the future. I don't know if the following has been tried, or not, but I can't imagine it is not too far in the future. Imagine if appetite could be controlled by DBS. We could cure morbid obesity by turning off appetite. When the target weight was achieved the stimulator could be turned off and "normal" appetite restored. Perhaps the stimulator could alter the appetite to achieve an appropriate caloric set-point. This type of brain surgery is not physically demanding on the patient. The PD patients, for example, are in the hospital only overnight. Compare this to the stomach stapling procedures, and I expect that the mortality and morbidity will easily favor a brain procedure over a somatic one. Then we can consider the effect of DBS on mood. Will there ever be a rationale for DBS for improving depression, or mania or sociopathic behavior or even sexual "deviancy?" We know that we can affect moods via DBS in some patients. Clearly this will be possible for some people in the future. But why stop there? Perhaps drug addiction might be curable with DBS, or at least replaceable with DBS. Animals have a "pleasure center," self-stimulation of which leads to animals preferring to give themselves small brain shocks even to eating or drinking, leading to death by inanition. Could smaller impulses replace one type of craving with another, more acceptable to authorities, and probably to the patient as well? Maybe it could eliminate craving completely?

And if some of these interventions are successful where will we stop? Is a brain shock any different than a drug? When will we be crossing the ethical line? Perhaps it is as "simple" as the Diagnostic and Statistical Manual in psychiatry. When a behavior is considered pathological to a committee from the American Psychiatric Association it becomes a treatment target. Now that DBS means that psychosurgery is reversible, we no longer have to worry about permanent harm. On the other hand, now that psychosurgery could be readily available, potentially for a large number of conditions, we have a lot more to worry about. ■

— JOSEPH H. FRIEDMAN, MD