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On Human Nature

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Francesco Clemente, Self-portrait with a Hole in the Head, *1981*

Too Desperate a Cure?

In the film version of Ken Kesey's sixties novel *One Flew Over the Cuckoo's Nest*, the hero, Randle Patrick McMurphy—a reasonably sane fellow who has been committed to a mental hospital for his rebellious and mildly erratic behavior—is so mercilessly oppressed by the tyrannical Nurse Ratched that he eventually loses his temper and assaults her. This is her triumphant moment, for it frees her to do what she has wanted to do all along: send him for brain surgery. The operation doesn't merely calm McMurphy down; it eliminates every distinctive aspect of his personality—indeed, everything that makes him human. His best friend, a warm but depressed American Indian with the physique of a polar bear, sizes up the situation by saying, "McMurphy wouldn't want this thing hanging around here for twenty years with his name on it." Accordingly, he smothers what's left of his friend with a pillow, an act we perceive as a wholly humane response to the hospital's official barbarism.

One Flew Over the Cuckoo's Nest was no mere horror fantasy. Thousands of American psychiatric patients had undergone the treatment known as frontal lobotomy during the 1940s and 1950s, and the results had not been pretty. Some of those patients (as many as one in twenty) died from the surgery. Others experienced side effects ranging from incontinence to epilepsy or paralysis, and many suffered a permanent loss of intelligence or motor skills. But perhaps the most disturbing feature of the operation was its effect on personality. As the American Psychiatric Association's commission on psychiatric therapies would report in 1984, "many patients, depending on the extensiveness of the section, were transformed into individuals without initiative of any kind—not infrequently to a vegetative state requiring almost complete supervision."

If psychosurgery was a controversial treatment during the 1970s, it is virtually taboo today. Ken Kesey's vision of Randle Patrick McMurphy, rendered inhuman as punishment for the crime of getting angry, has become emblematic of our culture's response to the issue. Historians still ponder the rise and demise of psychosurgery (Elliot S. Valenstein does so in his latest book, *Great and Desperate Cures*), but its actual use in the United States now consists of only a small number of extremely modest operations—most of them performed by a single surgeon: H. Thomas Ballantine, of the Massachusetts General Hospital. In a society that cannot quite come to terms with ECT—electroconvulsive, or shock, therapy, an excellent, proven, and basically safe treatment for severe, prolonged depression—the odds that psychiatric neurosurgery will ever make a comeback seem exceedingly slim. Yet Ballantine's pioneering work with a procedure known as cingulotomy raises important questions: Have we drawn the line in the wrong place? Have we become so squeamish about psychosurgery that we are ignoring treatments that hold great promise? And if we have, what is the human cost of our forbearance?

Psychosurgery—brain surgery for psychiatric illness—has a long and mostly undistinguished history. Trepanation, the practice of some primitive and ancient peoples in which a hole is made in the skull to let bad humors out of the brain, may go as far back as 2000 B.C. Roger of Salerno, a twelfth-century surgeon, recommended skull perforation as a treat-

ment for mania and melancholy, and Robert Burton's seventeenth-century classic, *Anatomy of Melancholy*, gave it a guarded endorsement as well, claiming that sword wounds penetrating the skull sometimes cured insanity. In modern times, this type of surgery apparently began around 1891, when Gottlieb Burckhardt described six patients he had operated on in Switzerland (he had tried, unsuccessfully, to treat mental illness by destroying part of the cerebral cortex), but it was rare until the 1930s, when the Portuguese neurologist Egas Moniz developed the prefrontal leucotomy, or lobotomy. (*Leucotomy*, the more precise term, meant cutting of the white matter, or fiber tract; but *lobotomy*, or cutting of the lobes, was the term that took hold.) By the time the technique won Moniz a Nobel Prize, in 1949, it had been performed on tens of thousands of people.

The procedure, as performed in this country by the neuropsychiatrist Walter J. Freeman and the neurosurgeon James W. Watts, involved inserting blades about a third of the way into each side of the brain, through holes drilled at the temples, and levering them up and down to sever major nerve fiber tracts in the frontal lobes. By thus interrupting the connection between the anatomical centers of thought (in the cerebral cortex) and those of emotion (in the limbic system), the lobotomy dimmed, or even eliminated, the patient's awareness of whatever feelings ailed him. Such radical cutting sometimes reduced or eliminated depression, obsessive compulsiveness, and intractable pain. But it came at a terrible cost.

While the lobotomy was losing favor as a treatment for common psychiatric disorders, neurosurgeons developed a different procedure, known as amygdalotomy, to subdue extremely violent patients. The amygdala—an almond-shaped structure located about an inch inside the skull—is a part of the limbic system involved in aggression, arousal, and fear. By destroying it, surgeons found they could sometimes transform explosive patients into docile ones—and this without the extensive damage of McMurphy's frontal lobotomy.

During the 1950s, follow-up studies of lobotomy patients established with clinical certainty what should have been clear all along: that many had suffered unacceptable losses. In response, surgeons began developing less radical techniques to achieve the same ends, with the result that lobotomy gave way to an operation called cingulectomy. Whereas lobotomy severs the entire connection between the limbic system and the cerebral cortex, the cingulectomy destroys only a four-centimeter segment of the cingulum, a bundle of nerve fibers that runs from the back to the front of the brain, straddling the two cerebral hemispheres like a set of railroad tracks.

Cingulectomy—still a highly invasive procedure—gave way in the early 1960s to cingulotomy, a much less radical interruption of the cingulum. This treatment, first reported on by Eldon L. Foltz and Lowell E. White in the *Journal of Neurosurgery*, in 1962, was soon taken up by Ballantine and his colleagues in Boston. It involves the passage of an electrode wire through two small holes in the top front portion of the skull. Guided by X-ray images, the wire targets a tiny region of the bundle and destroys it—not by way of crude, mechanical cutting but by precise electrical burning. Cingulotomy (which Ballantine still practices) posed fewer risks than its predecessors, and it showed promising results as a treatment for depression and intractable pain. It was the cruder measures—lobotomy, amygdalotomy, and cingulectomy—that became so controversial.

It wasn't just the intrusiveness of those more radical procedures that caused the outcry but also the applications that certain proponents seemed to favor. The neurosurgeons Vernon H. Mark and William H. Sweet and the psychiatrist Frank R. Ervin, for example, wrote a letter to the *Journal of the American Medical Association* in 1967 that implied that psychosurgery might help quell the urban riots then sweeping the nation: if, in each city, there were a handful of troublemakers with abnormalities of the amygdala, the troubles might have a medical explanation. These physicians seemed ready to diagnose as surgically treatable derangements of the brain the violent outbursts that many viewed as a complex social problem.

Psychosurgery had become such a bitterly divisive issue by 1973 that when it was addressed at a meeting of the Society for Neuroscience, leaflets attacking both the practice and its practitioners were distributed. Any physician willing to perform an amygdalotomy was a butcher, the dissidents implied. It was no more a medical treatment than were the chains and dungeons to which the mentally ill were confined during the Dark Ages, and its cost was greater: chains and dungeons may have punished the body, but they didn't extinguish the soul. So went the arguments of many knowledgeable people—arguments that have become conventional wisdom.

During the sixties, I, too, was insulted by the notion of damaging the brain to save the mind, and appalled by the overweening ambition with which many physicians had pursued the treatment. Pharmacology had produced other, truly effective treatments for severe mental illness—lithium for mania, chlorpromazine for schizophrenia, and a number of chemical remedies for depression. So why pursue surgical treatments with such potential for Orwellian abuse?

Then, during the seventies, I began to sense that the opponents of psychosurgery had become abusive themselves. I was present at that meeting of the Society for Neuroscience in 1973, and the leafleteers attacking psychosurgery began to seem shrill to me. Not content to debate the merits of particular forms of surgery, they resorted to distortion and intimidation to get their points across: they exaggerated the number of operations actually being performed, and they impugned the motives of physicians I knew to be basically well-meaning. The distinguished neuroanatomist Walle J. H. Nauta, who was president of the society, defended the importance of exploring treatments that could alleviate the suffering of people with severe mental illness. Those attacking psychosurgery most vigorously, he pointed out, were not always those who had witnessed the daily horror that mental illness can be.

That observation struck a chord in me. While in college, I had worked for a summer with a child whose autism cut him off completely from human contact; he went through life groaning to himself, a look of terror in his eyes, and modern medicine had nothing to offer him. This boy would not have been a candidate for psychosurgery, and I knew that emotional appeals to patients like him had prepared the way for lobotomy's abuses. But I wondered whether there was something specifically wrong in his brain—something that might some day be repaired surgically.

Another experience that changed my perspective was my realization, as a medical student during the early eighties, that nonsurgical treatments for mental illness are neither as harmless nor as effective as I had imagined. I sat for hours with a man who could talk of nothing but his inability to control his terrifying thoughts; years of drug treatment had brought him no relief. I got to know a lucid young woman who had suffered profound and irreversible nervous system damage from antischizophrenic drugs—drugs she probably had never needed, since her symptoms were mainly of depression. Many of the patients I saw *had* been helped by drugs, or psychotherapy, or shock treatment. But it was clear that, in other cases, none of these treatments was good enough.

As a student at the Massachusetts General Hospital, I met Ballantine and several of his patients. I talked with these patients before and after their cingulotomies, even took part in the operations, and I never witnessed anything resembling the spiritual murder of Randle McMurphy. The patient would be lightly sedated, the tiny burr holes drilled into the skull, and the electrode wire intro-

duced quickly and painlessly into the brain. Then, as images flashed on an X-ray screen, a current would be turned on for a minute or two and the wire withdrawn. Later the same day, the patient would be lucid and talkative—not noticeably changed, but at least more hopeful.

History and anecdote cannot answer the question of whether we should be employing particular surgical procedures. Only good research can, and good research has not been plentiful in relation to psychosurgery. In the United States, the brightest spot has been a study of Ballantine's cingulotomy patients, over the past fifteen years, by an independent group at the Massachusetts Institute of Technology. In this study, initiated by the behavioral neuroscientists Hans-Lukas Teuber and Suzanne Corkin, patients have undergone psychiatric and neuropsychological testing before, immediately following, and years after the cingulotomy procedure.

In 1980, Corkin published preliminary results on a group of eighty-five patients —twenty-six suffering from intractable pain and fifty-nine from psychiatric disorders, the most common being depression. Each patient had been given thirty standard psychological tests: two of overall intelligence; seven that register frontal lobe function (for instance, the ability to sort the same cards by different principles); seven of memory; three of spatial ability; eight of sensory and motor activity; and three of personality. Each subject also underwent a thorough neurological examination. Although several patients developed postsurgical complications, the principal finding—one that was replicated in a later study, of more than a hundred and eighty patients—was that cingulotomy is generally safe. In fact, in the initial study, the operation was followed by at least moderate short-term improvement in seventy-five percent of the pain patients and sixty-one percent of those suffering from depression.

Further analysis of the larger sample has since bolstered the conclusion that cingulotomy is a relatively harmless procedure, but Corkin has become skeptical about whether it brings any benefits. One reason is that not all the patients have made themselves available for follow-up study, and it is possible that those who benefited least from the surgery were the least likely to show up for reexamination. Moreover, the study necessarily lacked two key features of a controlled experiment—random assignment of similar patients to one treatment or another and the performance of sham, or placebo, operations—so it is possible that the benefits were partially psychological in origin.

Ballantine and his colleagues, meanwhile, have conducted their own study and are (not surprisingly) more optimistic. In a report last year, in the journal *Biological Psychiatry*, they summarized the results of more than seven hundred cingulotomy procedures performed on some four hundred patients over a period of twenty years. Their data document not only a low level of risk (there were two cases of partial paralysis as well as a one-percent incidence of seizures, always a risk with brain surgery) but also, for many patients, a significant benefit. Ballantine found that some disorders were consistently more responsive to the treatment than were others; the operation was less effective for treating obsessive-compulsive illness or schizophrenia than for alleviating depression and anxiety. But, overall, sixty-two percent of the psychiatric patients experienced considerable improvement following cingulotomy. Some even went on to function normally without medication.

In the light of these studies, three things seem fair to say. First, cingulotomy, as practiced by Ballantine, appears to cause no significant cognitive or emotional harm. Second, the operation may be an effective treatment for chronic pain. And, third, it may alleviate chronic anxiety and depression. These effects could turn out to be temporary or to occur only in certain patients; the obvious way to find out is to amass more data on the procedure. But on that front, the news is not encouraging—at least not in this country.

Outside the United States, physicians are actively studying several forms of psychiatric neurosurgery. This is true in such countries as Spain and India, where less stringent systems of medical regulation might make us skeptical, as well as in England, where no such skepticism is warranted. Hundreds of British patients have had a promising operation called subcaudate tractotomy, which involves a small interruption of fiber tracts leading to the frontal lobes under the head of the caudate nucleus, a large, arc-shaped paired structure located below the cingulum bundle. The technique, very similar to cingulotomy but with a different target, also attempts to reduce the volume of impulses traveling between the emotional and cognitive centers of the brain. Follow-up studies indicate that the operation may help alleviate both depression and obsessive-compulsive illness. Meanwhile, yearly advances in neurobiology, including a better understanding of the structure and function of the limbic system, promise to suggest other sorts of interventions that might be worth trying. These could be surgical, chemical, or even combined approaches that would introduce chemicals to specific parts of the brain.

In the United States, these approaches are receiving little attention. More than ten years ago, a federal commission concluded that "there are circumstances under which psychosurgical procedures may appropriately be performed" and recommended that the government "conduct and support studies" of specific procedures. Yet psychosurgery remains such a taboo that few physicians are willing to stake their careers on it. In the decade since that report was issued, Ballantine's and Corkin's studies have been the only ones undertaken in this country. Ballantine will retire in a few years, and when he does, patients for whom cingulotomy is the sole hope may be deprived of it altogether. What's worse, the slowly advancing frontier of knowledge about psychosurgery may come to a halt.

I think of the patient I knew who was permanently harmed by a routinely prescribed antischizophrenic drug. No one who has undergone cingulotomy, with the exception of the few who experienced hemorrhages or convulsions, has suffered *any* detectable nervous system damage, let alone the severe movement disorder and postural deformity she had to live with. She would almost certainly have been better off with the surgery. That cannot be said of every depressed patient, but those who have tried everything else should be offered the opportunity to take part in a properly supervised clinical trial. One must look into the eyes of the mentally ill, must see something of their pain, before concluding that brain surgery will always be too desperate a cure. ●

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