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Brain Surgery That Takes on Tremors Without a Drill

A new procedure that uses focused ultrasound to destroy a spot in the thalamus may help people with tremor

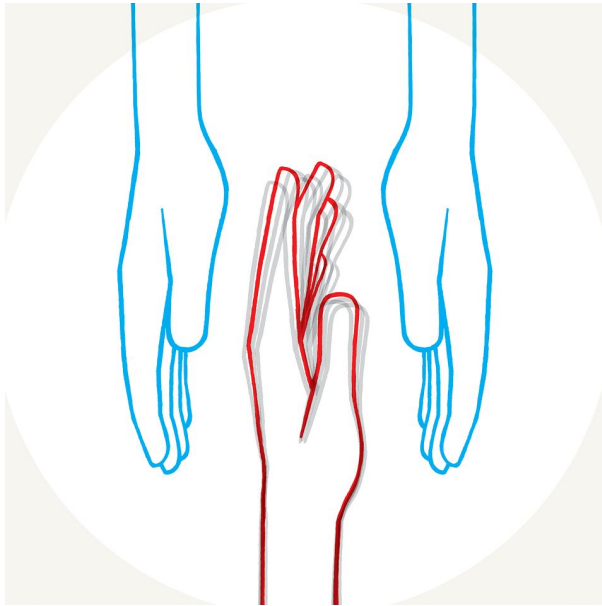


ILLUSTRATION: TOMASZ WALENTA

By MELVIN KONNER

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Many people will struggle to read this article in print or on a phone or tablet because their hands are shaking. They also may find it hard to eat, dress, work and do other things that the rest of us take for granted. Most of them do not have a well-known brain disease such as Parkinson's. Instead, they have what doctors call "essential tremor."

This illness, the most common movement disorder, affects seven million Americans, most of them elderly. New devices such as high-tech eating utensils can compensate for the tremor to some degree, but real solutions have eluded us. Drug treatments often stop working eventually. Conventional brain surgery can help, but it involves drilling a hole in the skull.

No muss, no fuss, no blood, but it is real surgery.

But there's hopeful news. A new, far less invasive surgery, using a procedure called focused ultrasound, minimizes the risk of hemorrhage and infection and has been working in many cases, as an article in the *New England Journal of Medicine* attested in August.

Essential tremor shows itself as an uncontrollable shaking, usually of both hands and arms, and it gets worse with intentional movement. The rhythm tends to be slow and the amplitude large. Without any specific tests, the diagnosis is what doctors call a "rule-

out”—given after other maladies have been ruled out.

The big problem for those trying to treat essential tremor is that nobody knows its cause. “Essential” is one of the terms that doctors use instead of saying, “We don’t know what makes this happen.” Scientists can only direct treatments at the symptoms.

In this illness, the important medications include propranolol (also used to treat blood pressure and heart problems) and primidone (an anti-seizure barbiturate). They reduce tremors by 60% in half the patients but have significant side effects.

Traditional surgery for the problem involves inserting a wire through a drilled hole in the skull. It’s been known for some decades that the thalamus, a kind of relay center for the brain, is part of the neural circuit underlying essential tremor. The tip of the wire reaches a spot in the thalamus deep in the brain. The area can be destroyed, interrupting the tremor circuit, or stimulated strongly enough to disrupt it. The patient controls this “deep brain stimulation” with a remote. When it’s turned off, the tremor returns. The advantage of this procedure is that if it affects the wrong part of the brain, it is reversible—no part of the brain has been damaged.

By now we know ultrasound’s ability to show our gallstones or our unborn child sucking her thumb. Focused ultrasound is not meant to reveal things deep within the body but to *alter* them. Think of using a magnifying glass on a sunny day to burn a hole in paper: Only the focal point is on fire. Similarly, an acoustic lens can focus many beams of ultrasound on a target—in this case, destroying it.

In the new focused-ultrasound study, Jeffrey Elias and colleagues took 76 patients (with an average age of 71) with moderate to severe hand tremors. Using focused ultrasound, the researchers destroyed a spot in the thalamus for 56 participants. The other 20 patients received a placebo procedure at first and the ultrasound later.

Among the first 56 patients, the procedure improved overall tremor scores by almost 50%, while the placebo group improved not at all—until they too got the ultrasound. The patients initially improved 60% or more in eating, drinking, hygiene, dressing and working, and almost that much in writing. Participation in social activities improved over 70%—important because sufferers are often too embarrassed to play games or socialize outside their home.

The improvements reversed to a degree the next year, but patients remained much better than before. So the success, while real, was limited, and longer follow-up is needed. There is still an argument for deep brain stimulation—skull hole and all—because it won’t cause permanent damage. These are still early days for focused ultrasound, but some lucky patients are already finding that life is shaking them up a little less.

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