Neurosurgery One

Advancements in Deep Brain Stimulation – Video Transcript

Dr. VanSickle (00:00):

Deep brain stimulation became an interest when I first started neurosurgery 13 years ago in practice because my first patient did so well, but I spent the better part of my career since that time, perfecting that surgery so that the complication rates can be lower and that the patients can do better. Deep brain stimulation consists of electrodes which are placed deep in the brain, hence the name. Those electrodes are placed in different structures. Typically, an area of the thalamus called the VM, or an area of the basal ganglia called the globus polys internus, or an area under the thalamus. It's called the subthalamic nucleus. What all of those features or all those areas have in common is that they're really tiny. So, the goal of the surgery is to insert those electrodes into those areas highly accurately. Now, in the past, the best way to do that was with a patient awake.

(01:04):

By having somebody awake, we could fine tune just exactly the right location by testing them neurologically during the procedure. What we've realized over time is what we gained by that testing we lose in precision of the surgery. For example, if we open up a hole on top of the head air gets in the brain, the brain moves around. That air's called pneumo FHAs, and that leads to inaccuracy. Now, we can do the surgery, asleep in a much more highly precise manner using robot in the operating room with a live CT guiding our electrode to exactly where we want it. What we've demonstrated is that we can achieve an accuracy more than twice as good as we could back when we did the surgeries awake. There have been some other unpredicted benefits of that. One of 'em is a lower infection rate. In the past, infection rates were very high, and in fact quoted as around three and a half percent.

(02:04):

That may not seem high, but it is very high when you understand you have to take the entire system out and redo the whole surgery a number of weeks later after antibiotics. In our practice, our infection rate is well under 0.3% per side, better than 10 times less chance for an infection than the national average. The most common reason we do deep brain stimulation here at neurosurgery one and nationwide is to treat Parkinson's disease. A long time ago, we would wait until the disease got very bad before we'd intervene, but now we intervene quite a bit earlier. In fact, the FDA recommends moving forward with deep brain stimulation about four years after the symptoms first start in a few months after your symptoms fluctuate up and down with medications that's considerably earlier

Dr. Vansickle (02:59):

than we would've ever moved forward in the past. Deep brain stimulation has been studied multiple times with randomized controlled trials. So in medicine, we know what to do based on

studies that are performed, and the best studies are randomized controlled trials. So, these are trials where you take a group of individuals and you divide them up to either get the treatment or to not get the treatment, and they don't get to decide which group they're in. Furthermore, the doctors don't get to decide which group they're in. Therefore, it removes any bias that might exist in the outcome of the study. Even better it is a blinded study such that the doctor doing the evaluation doesn't know whether they had the surgery or not. It's really hard to do a double blinded study. That's one where the patient wouldn't know whether they got surgery or not, but we can at least do single blinded studies there.

(03:53):

I know of at least five very large single blinded randomized controlled studies for Parkinson's disease, all of which say that the quality of life improves with deep brain stimulation. So, to put that in perspective with other diseases, say as you should have your appendix out, if you have appendicitis, we don't have nearly such good quality of evidence yet that is a commonly accepted, commonly utilized procedure. DBS for Parkinson's disease is one of the most studied diseases or one of the most studied treatments of all, just as there's fantastic evidence that DBS helps improve quality of life. If you have Parkinson's disease, there's actually a little bit of evidence not as good in quality, but there's a little bit of evidence that you'll live longer with deep brain stimulation. This actually comes from the National Health Service out of England. What they did is they offered DBS in around 2001 to a large number of individuals, just like we did here in the United States.

(04:57):

It was approved here in the United States in 2002 by the FDA. Then what they did 10 years later, is they called up all the families or all the patients, and they found out, well, how well is that person doing? And what they were interested in was not their quality of life in this case, but whether they were alive or not, and they found that there was a 40% greater chance of being alive 10 years later had you selected to have deep brain stimulation. Now, that's not a randomized controlled trial. And randomized controlled trials are best evidence, but there's no ethical way to withhold a treatment and randomize somebody to the non-treatment group if you know that there's such a better chance that they might live a little bit longer. Now, we don't think that deep brain stimulation cures Parkinson's. It's just a very effective treatment, but that effective treatment allows our patients with Parkinson's disease to be more mobile, and by being more mobile, their heart and their lungs are in better condition, and hence the longevity.