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For complex brain surgeries, doctors turn to robotic ROSA

BY DEEPA BHARATH

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UC Irvine Medical Center is the first hospital on the West Coast, and one of only a dozen nationwide, to use ROSA – a robotic device employed to perform neurological procedures including finding exactly where in the brain seizures originate and burning off deep brain tumors in a minimally invasive manner.

Dr. Sumeet Vadera, a neurosurgeon at UCI, says this \$650,000 device approved by the U.S. Food and Drug Administration has revolutionized certain types of brain surgery. Vadera says he underwent training to perform surgery using the robotic device at the Cleveland Clinic. He talked to the Register about how the device works, what it is used for and the risks associated with it.

Q: What does the device do?

A: This device is comparable to a “GPS” for the brain. It can be used in any type of cranial procedure that requires surgical planning with preoperative data ... and precise position and handling of instruments. It’s the only robotic assistant approved for neurosurgical procedures in the United States. What the device does is use facial recognition technology to create a GPS map of the patient’s brain. Using that information, I create trajectories for procedures and the robotic arm assists me with the rest of the procedure.

We are using this device successfully in SEEG (stereoelectroencephalography) epilepsy surgery, a minimally invasive procedure that is used to identify areas of the brain where epileptic seizures originate. We can actually find out where the seizures are coming from and stop them from occurring. The robotic device can also be used for brain biopsies. UCI is one of the few centers that is also going to use this device for deep brain stimulation in Parkinson’s patients and individuals with other neurological disorders to decrease symptoms such as tremors. Dr. Frank Hsu, chairman of neurosurgery at UCI, performs those procedures.

This device has been novel and groundbreaking, especially when it comes to burning deep-seated tumors that are otherwise difficult to access through surgery. Through a process called laser ablation, I could send a laser into the lesion or tumor in the brain and burn it. Through live imaging, I can see the tumor as it’s getting burned by the laser. The laser surgery is done with the patient in the MRI machine.

Q: Why is this considered a minimally invasive procedure?

A: It is significantly less invasive than a craniotomy, where a bone flap is temporarily removed from the skull to access the brain. Using the robotic device, I make multiple pinhole-size incisions in the scalp. We don't have to clip much of the hair. We can even do the surgery with a dime-sized clipping of the hair.

The robotic arm takes the surgeon to the exact point in the brain that needs to be accessed. The device allows the neurosurgeon to easily guide the instruments by hand within the limits and restrictions established during the planning stage.

Q: What are the risks involved with these procedures?

A: The risks are much lower than in an open craniotomy. The main risk is bleeding. While passing lasers or electrodes into the brain, there is the possibility that blood vessels could get ruptured. But, we have the technology that is needed to avoid brain vessel ruptures. There is no such thing as zero risk. But I will say that the risks are minimal and much lower than a craniotomy where there is a large incision and the healing time is much more.

Q: How long is the recovery?

A: For the laser procedure and the epilepsy surgery, the recovery time is one day compared to four to six weeks after a craniotomy. We've seen patients do really well post surgery. The risk for infection is almost zero.

Q: Do patients need to pay more to opt for the robotic surgery?

A: No, patients don't incur any costs and these procedures are covered by health insurance. Robotic surgery is not for everyone. Some patients are better candidates than others. However, it is a good option in cases where patients would otherwise need major surgery.

Contact the writer: 714-796-7909 or dbharath@ocregister.com

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