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TRILOGY IMAGE-GUIDED RADIOSURGERY SYSTEM PRECISELY TARGETS TUMORS AND LESIONS NEAR THE SPINAL CORD AND OTHER CRITICAL STRUCTURES

New technology provides a treatment option for retired LAUSD school principal

LOS ANGELES (10-01-08) – When an arteriovenous malformation ruptured near the base of Anna Ruth McLinn’s brain on Oct. 8, 2007, the retired elementary school principal underwent emergency surgery at Cedars-Sinai Medical Center that saved her life. The bulk of the malformation – an abnormal tangle of blood vessels – was removed and a clip was put in place to reduce the risk of further rupture. Because the lesion was positioned adjacent to her spinal cord, however, the surgeon could not safely remove 100 percent.

But new technology installed this summer at Cedars-Sinai’s Samuel Oschin Comprehensive Cancer Institute has allowed physicians to treat the remaining malformation without surgery. The Trilogy™ System provides highly focused, image-guided radiotherapy and radiosurgery, which is ideal for treating malformations, tumors and other lesions that are in close proximity to the spinal cord or other critical structures.

McLinn, 67, a Los Angeles resident who retired after 36 years with the Los Angeles Unified School District, was talking on the phone when she suddenly felt as if her head was being yanked backward. By the time she hung up and dialed 911, she was unable to speak, but paramedics arrived within minutes, broke through the door and rushed her to Cedars-Sinai.

“We initially thought she may have had a ruptured brain aneurysm, but an angiogram – a blood vessel study – showed an abnormal tangle of blood vessels in the very upper portion of the space around the spinal cord,” said neurosurgeon Wouter Schievink, M.D., who performed the operation and serves as director of Microvascular Neurosurgery in Cedars-Sinai’s Department of Neurosurgery.

Although they are present from birth, arteriovenous malformations often remain undetected, but the walls of the abnormal vessels are fragile and more susceptible to rupture than normal blood vessels. The National Institute of Neurological Disorders and Stroke says these malformations exist in about 300,000 Americans, but only about 12 percent of affected people experience symptoms and only two to four percent have a hemorrhage.

Depending on the size and location of a malformation, several treatment options, including surgery, may be considered. In some instances, a minimally invasive procedure called endovascular embolization can be used to deliver a device or substance that blocks off the malformation’s blood supply. In other cases, radiation targeting the smooth muscle of the defective artery can trigger an inflammatory reaction that gradually seals off the vessel.

But McLinn’s arteriovenous malformation was not accessible through the endovascular procedure and it was located too close to the spinal cord to risk radiation damage, prompting Schievink to opt for the surgical

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approach. Although he was able to remove most of the malformation, a small portion remained directly in front of the spinal cord. The treatment team decided to give McLinn time to recover from the hemorrhage while they monitored the residual section to see if it might seal off spontaneously, as sometimes happens.

In the meantime, McLinn began to experience a series of serious medical setbacks – which she likens to a car that has been running fine for years until one thing goes wrong. “The motor stopped running, my transmission broke down, and after that, all the other parts started to fall apart.” She and her medical teams battled back each time, and McLinn went home after a two-month hospital stay.

The residual section of the malformation was still in place, however, and even though it was small, it posed a continuing threat of hemorrhaging again someday. But Cedars-Sinai was moving forward with plans to install a sophisticated new device that would make radiation therapy an option in situations like McLinn’s. The Trilogy System went online June 16, and McLinn underwent a series of five treatments between July 23 and 29.

“High-dose radiation is excellent for controlling arteriovenous malformations, but we haven’t been able to use it in the past if a lesion was close to the spinal cord or other critical structures. Image-guided radiotherapy allows us to focus the radiation precisely and reduce the size of the treatment field considerably,” said Amin J. Mirhadi, M.D., radiation oncologist specializing in stereotactic spinal surgery at Cedars-Sinai.

“Image-guided technology provides a much more effective way of delivering radiation for lesions of the spine, lung and liver, in particular. It is now an option for many inoperable lung lesions, for example, and in some cases it may be the best option even if a tumor is operable,” Mirhadi said.

“Trilogy’s image-guided treatment capabilities add another dimension to Cedars-Sinai’s radiation therapy arsenal, which includes the Gamma Knife® Center,” said John S. Yu, M.D., director of Surgical Neuro-Oncology at Cedars-Sinai. “Each system has its strengths and offers advantages in certain situations. Together they allow us to provide a comprehensive array of options rarely found in a single center.”

The Gamma Knife, which employs a frame to immobilize the head, is the first choice for most tumors and other lesions in the brain. Trilogy is a “frameless” system that can precisely treat lesions in areas of the body that are not easily immobilized. It uses a specialized CT scanner built into the treatment planning machine to ensure that the radiation dose precisely hits its target. Among other features is a “respiratory gating” capability that, when necessary, can take a patient’s breathing into account and time the delivery of radiation accordingly. Radiation is delivered through multiple “arcs,” which minimizes the dose of radiation to surrounding tissue but intensifies it at the point of intersection, Mirhadi said.

McLinn has a long relationship with Cedars-Sinai. She first came to Cedars of Lebanon Hospital at age 28 and has been a patient several times, including twice to give birth to her children. She will return for follow-up angiograms six months and a year after her Trilogy treatment.

Alluding to her automotive analogy, she said, “I think my car is being repaired pretty well. It’s an old model but it’s going to be OK.”

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