

CyberKnife

Barrow's new high-tech device - the first in the Southwest - kept this teacher in the classroom during treatment for a spinal tumor

Evelyn Brinkerhoff is a single mother. She has 34 children. Her love for each is surely a storybook in its own right, but, for the time being, some light reading, inspirational writing and simple arithmetic help to tell her tale.

Evelyn has brought six wonderful children of her very own into the world, ranging from 17 to 31 years of age. Then there's her sixth-grade class at Sonoma Ranch Elementary School in Gilbert, Arizona, made up of 28 additional angels who keep Evelyn company five days a week.

No wonder she's felt especially blessed since January 2003, when a routine series of examinations diagnosed melanotic schwannoma - a rare and potentially cancerous lesion found between her L3 and L4 vertebrae - requiring surgery.

Initial surgery was thought to be successful but, by June, Evelyn's tumor had grown back with potentially life-threatening implications. Several well-known neurosurgeons presented treatment options, but it was Evelyn's daughter-in-law, Staci, who did some research and pointed Evelyn to Randall Porter, MD, and CyberKnife® technology at Barrow Neurological Institute. CyberKnife treats cancerous lesions and tumors with noninvasive radiosurgery, meaning it requires no incisions, no anesthesia and virtually no recovery time.

Dr. Porter explained Evelyn's options to her. A major concern was the location of the lesion on her spine. He told her that invasive surgery posed significant risk of severing a major nerve that could paralyze her leg.

Fortunately, Dr. Porter's study of noninvasive treatments and Barrow's recent acquisition of CyberKnife allowed Evelyn to choose a much more flexible and far less painful course of action.

An Extension of Gamma Knife

CyberKnife is broadly a technology extension of Gamma Knife, a frame-based radiosurgery tool that originated in the late 1960s. Gamma Knife destroys lesions in the brain by focusing 201 beams of cobalt-60 radiation on a precisely defined treatment site. It continues to be an excellent option for brain tumors, but it does not provide treatment below the jaw. Gamma

Knife requires local anesthesia and pin placement in the patient's skull so a fixed head brace can be secured.

Until recently, any patient with lesions below the jaw essentially had to opt for 25 to 30 treatments of standard, low-dose radiation, treatment that destroys cancer cells but also endangers the healthy cells surrounding them.

CyberKnife treatment does not require a head frame, anesthesia or incisions. It simply delivers a concentrated dose of radiation exclusively to cancerous cells while patients rest comfortably for about an hour. Physicians monitor progress and speak with patients by intercom throughout the procedure.

Precision Pays Off

Dr. Porter speaks with enthusiasm when explaining the flexibility CyberKnife affords his patients. His appreciation for both the technology and the people who helped bring it to him is evident.

CyberKnife's centerpiece is the Kuka robot arm, a large industrial-shaped device more commonly used for welding on automobile assembly lines. Repurposed and reconfigured for healthcare by Accuray, a privately held Silicon Valley company, the Kuka arm uses custom-built software to perform radiosurgery with millimeter precision.

"The CyberKnife delivers radiation with 0.2 mm accuracy over thousands of repetitions while the robot arm continuously tracks and treats cancerous cells," explains Dr. Porter. "Gamma Knife gives us 201 positions of radiation, while CyberKnife runs 110 different position modes by 12 different angles to give us 1,320 total positions in which radiation can be delivered."

CyberKnife also parlays this precision to track patient movement. Take lung treatment, for example. Traditional procedure requires a patient to hold her breath - temporarily stabilizing the lung lesion - while quick intervals of radiation are delivered. CyberKnife's Dynamic Tracking Software, on the other hand, monitors chest movement with such accuracy that a consistent beam of radiation can be delivered to target cells while the patient breathes normally.

Hospital and patient finances are aided as well. Dr. Porter estimates that CyberKnife can reduce some patients' discharge bills by nearly 75 percent.

All In A Day's Work

All this technology-speak has translated well into Evelyn Brinkerhoff's vocabulary. It didn't take her too long to realize the exponential benefits that CyberKnife could offer. "Initially, I was skeptical of the promises this

new technology was making,' notes Evelyn. "After some thought, I scheduled my treatment but then canceled to think it through further. Soon after, I came to understand the increased probability of avoiding paralysis in my legs, and my confidence grew."

Barrow didn't need long to reschedule Evelyn either. With procedures significantly reduced and overnight patient stays virtually eliminated, Dr. Porter's team was able to provide Evelyn with a flexible, painfree treatment plan that fit her lifestyle.

Barrow commonly schedules CyberKnife treatments around patient schedules, so their normal routine is disrupted as little as possible. Evelyn taught her sixth graders for half-days, leaving at lunchtime for appointments during her four-day course of treatments. Here's a peek at her schedule, which began in September 2003:

Wednesday, Sept 12th -

Made a half-day, pre-treatment visit for CT scan, MRI, placement of tracking fiducials, and a body cast to comfortably position Evelyn during her CyberKnife treatments.

Wednesday, Sept. 19th -

Woke at 6 a.m., breakfast with daughter, at school by 7:30 a.m. Home for lunch at noon, then over to Barrow for 3:30 p.m. CyberKnife treatment. First treatment until 4:30 p.m., left for home by 5 p.m.

Thursday, Sept. 20th -

Woke at 6 a.m. feeling well, breakfast with daughter, at school by 7:30 a.m. Taught half day, home for lunch at noon, over to Barrow for second treatment at 3:30 p.m. Left for home by 5 p.m.

Friday, September 21st -

Woke at 6 a.m., still going strong, breakfast with daughter, at school by 7:30 a.m. Taught full day, arrived for third and final treatment at 3:30 p.m. Home to rest shortly after 5 p.m.

Saturday & Sunday -

Tired, yet pleased with progress, rested over the weekend.

Monday -

Back to school full-time.

Dr. Porter's prognosis for Evelyn is positive. He notes that "CyberKnife made a tremendous difference in accelerating Evelyn's recovery." Evelyn says she couldn't be happier. "I feel better than I have in the last four years, and that's good news." She's validated this by re-enrolling for her master's in guidance counseling at University of Phoenix.

As for the rest of Evelyn's story, well, she's still in the process of writing it. That's the best news of all.