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Restoring lost NERVE FUNCTION

Surgeon here uses cadavarous transplants to replace damaged links

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Lyrics to the song "Submission" by iconic punk rocker Sid Vicious and the Sex Pistols floated through a Providence Holy Family Hospital operating room as Dr. Kurt A. Anderson, peering intently into a surgical microscope, repaired damage inside the deeply gashed forearm of a 44-year-old male patient.

The surgery was the seventh of the day for Anderson, an orthopedic surgeon with Orthopaedic Specialty Clinic of Spokane PLLC. This procedure was unusual, though, in that it was just the fourth performed here—all by Anderson, over about the last six months—using "minimally processed" sections of human-donor nerve that Alachua, Fla.-based AxoGen Inc. treats and markets commercially under the brand name Avance Nerve Graft.

The graft is used mostly to repair nerves damaged in traumatic injuries, such as from stabbing, slicing, or crushing. In this case, the patient had ripped open the underside of his right forearm—nearly from wrist to elbow—on the sharp edge of a severed metal drum in an industrial accident about a week earlier, then had complained of tingling and weakness in his fingers.

The surgery required Anderson to remove the numerous large sutures in the man's arm, reopen the wound, identify and remove the damaged area of nerve causing the problems, and suture in the graft, thus hopefully enabling the nerve to regenerate.

—STAFF PHOTO BY KIM CROMPTON

Dr. Kurt A. Anderson, foreground right, places a human-donor nerve graft in the arm of a 44-year-old man at Providence Holy Family Hospital. The operation took about an hour.

The ability to use an "off-the-shelf" human nerve for such a repair, rather than having to take a section of nerve from somewhere else in a patient's body, as often is the case, has multiple advantages, Anderson asserts. It greatly speeds up the surgery, which is good since it's preferable to keep a patient under anesthesia for as little time as is necessary, and it eliminates potential sensation problems that might be caused by removing a healthy nerve elsewhere.

"It's much easier," with the surgery typically taking only about an hour, Anderson says, adding that he has been encouraged by improvements in the three other patients in whom he's placed an Avance Nerve Graft.

He says he's participating in national studies evaluating the effectiveness of the graft in restoring nerve function and expects to discuss his experience with it at a hand and upper extremity trauma conference he'll be chairing at the Davenport Hotel on Aug. 6-7. He estimates that about 40 surgeons from throughout the Northwest will attend the conference.

> Dr. Kurt A. Anderson says he's participating in national studies evaluating the effectiveness of the commercially sold graft.

Anderson earned his medical degree from the University of Arizona, in Tucson, and completed a five-year orthopedic surgery residency, including an internship in general surgery, at the University of California-Davis Medical Center, in Sacramento Calif.

He joined the Orthopaedic Specialty Clinic of Spokane, at 785 E. Holland, two years ago after completing a yearlong fellowship in hand, upper extremity, and microvascular surgery at The Indiana Hand Center, in Indianapolis, Ind., which specializes in studying and treating upper extremity disorders.

His training focused on the treatment of musculoskeletal problems in the upper extremities, including arthritis, joint replacement, trauma reconstruction, injuries from overuse, and abnormalities that are present from birth.

His areas of expertise include treating acute injuries to the shoulder, elbow, wrist, and hand, as well as performing arthroscopy and reconstructive procedures to restore a high level of function after an injury.

In nerve-repair surgery, he says he'd like to expand his use of the Avance Nerve Graft, if the data continue to show positive outcomes and as other doctors refer more nerve-damage trauma cases to him, and believes it could see more widespread adoption here and nationally over time.

Kevin Barlow, a Spokane-based trauma sales representative for Stryker Orthopaedics Inc., which has an exclusive agreement with AxoGen to distribute the Avance Nerve Graft and other upper-extremity products, says, "It's a new technology. Literature is coming out to support it."

Barlow introduced Anderson to the Avance Nerve Graft and has been present at three of the four surgeries Anderson has performed using "the product," answering the surgeon's questions when needed and offering general technical support. He says Anderson is the only surgeon in the Spokane-Coeur d'Alene area using the Avance, which is the only human-donor nerve graft available to surgeons.

Surgeons often prefer when possible to try to repair damaged nerves directly, rather than having to resort to a graft or a bridging conduit made of bovine collagen or some similar material, as has been done for years, he says.

Such repairs can create tension on the nerves that prevent them from regaining full function, however, and also in some cases, the gap between severed ends of the nerve is too large to allow for the ends to be cleaned up and rejoined easily, he says.

Monica Tarver, a spokeswoman for AxoGen, says, "We provide a natural bridge. We provide a scaffold of the nerve. What we need is that three-dimensional structure (that provides a channel for nerve regrowth) so the body can heal."

AxoGen is registered with the U.S. Food and Drug Administration as a human cell and tissue establishment, which Tarver says is a designation the government requires of companies offering tissue-based products to ensure that certain safety and processing standards are followed.

It obtains the nerves from entities that collect the tissues and organs of deceased donors. Its Web site says its "donation partners" include organizations such as the American Association of Tissue Banks, Donate Life America, and LifeNet Health.

AxoGen then uses a patented chemical process to preserve the nerves' 3-D structure and cleanse them of growth inhibitors, while retaining a naturally occurring growth-promoting protein. The result, it says, is a nerve graft that's well-suited to help regenerate the nerve in the recipient's body and that the body won't try to reject.

AxoGen began marketing the Avance Nerve Graft in July 2007. Study results presented a couple of months ago at an annual meeting for regenerative medicine practitioners showed that, to that point, more than 500 Avance Nerve Grafts had been implanted in humans, with no reports of tissue rejection or other adverse events.

AxoGen provides the Avance Nerve Graft in several lengths—from 15 to 50 millimeters, or roughly half an inch to about two inches—and in various diameters, down to as small as 1 to 2 millimeters, according to its Web site.

Barlow says they typically range in price from around $1,000 to $2,000. Hospitals buy them and ultimately bill the patients for them.

Anderson says any added cost for the graft itself is offset by savings resulting from the surgery being shorter and less complex, plus the benefit to the patient of not having to extract a healthy section of nerve through a separate surgical procedure.

Tarver says the demand for the Avance Nerve Graft is growing, nationally and internationally, and asserts, "We're actually changing the way surgery is done."

For the surgeries done here, Anderson has been using a new surgical microscope that Holy Family bought last year at his urging, at a cost of more than $150,000, and that the hospital expects to be used extensively for hand surgery.

Richard MacDonald, the hospital's director of preoperative services, says Anderson wants to set up a hand surgery program at Holy Family, which could result in more procedures being done there. The hospital also bought two other new surgical microscopes last year, at a similar cost, one to be used mostly for neurosurgery and the other for ophthalmology, and which are technically superior and have better visualization than earlier-generation microscopes they replaced, MacDonald says.

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—STAFF PHOTO BY KIM CROMPTON

The nerve graft, shown here, is preserved at minus 40 degrees, but quickly thawed in a saline solution just before it's to be implanted in the patient.