ORTHOPEDICS & SPINE TODAY

MAY 2022

New for ACLs: Natural Repair Instead of Reconstruction

Anterior cruciate ligament (ACL) tears are, unfortunately, a common injury for athletes and the active. Their reconstruction with a transplanted tendon has been an extended process, with long-term joint health and stability less than guaranteed. A major stride in addressing this challenge takes advantage of an innovative technique for repairing the native tendon and holds the promise of improving outcomes for ACL injuries.

The Bridge-Enhanced ACL Repair (BEAR) procedure uses a resorbable implant that allows the tendon to rejoin itself. "We're excited about this breakthrough that permits patients to heal more naturally," said Sean McMillan, DO, sports medicine surgeon at Virtua Orthopedics & Spine.

Bridge for ACL to Heal Itself

Unlike some connective tissue structures, the ACL does not heal on its own. Standard ACL reconstruction removes the torn ligament in favor of a tendon graft (typically an autologous hamstring or patellar tendon segment), which surgeons attach by drilling its ends into the bone.

The new BEAR procedure combines suture repair with the novel use of a sponge-like material made of special proteins (a bovine-derived extracellular matrix) placed into the gap in the ACL. This insert provides a bridge through which the ligament can grow while maintaining its original attachments to the femur and tibia. The surgeon then uses sutures to pull the torn ends of the ACL into the sponge so that the ligament, stimulated by the patient's own blood, can grow into the implant to reconnect.

Potential for Better Recovery and Outcomes

Conventional reconstruction involves harvesting a graft from a healthy portion of the knee, which adds to recovery time and can impact strength of the joint and ability to return to full capacity. Or, it involves taking a hamstring graft from the surgical leg, which can bring compensatory stress in the nonsurgical leg leading to contralateral tears. BEAR avoids these issues, though the six-to-eight-week recovery that is standard for ACL repair differs slightly with BEAR, necessitating less weight bearing and flexion to allow the implant to incorporate. But just as with traditional repair, patients can typically return to sport at about nine months.

Traditional reconstruction generally has good outcomes, but leaves a substantial portion of patients unable to return to their preinjury level of activity, particularly with regards to athletics. It is also accompanied by a high re-tear rate and percentage of patients who develop arthritis decades later.

Virtua in the Vanguard

Virtua was the first center in New Jersey and one of the first in the country to perform the BEAR procedure after FDA approval, and has now been selected for a continued post-market clinical trial to collect longer-term data.

"I think we were chosen in part because of our experience launching innovative orthopedic technology, like the bio-inductive implant for rotator cuffs previously. I also feel that our research department is one of the best in South Jersey and up to the task of such high-level research," said Dr. McMillan. "So far, with the BEAR—like with the cuff—we're seeing less postoperative pain and some better eventual joint articulation. From the data to date, we think that we will see greater knee stability too and thus less osteoarthritis in the decades following surgery."

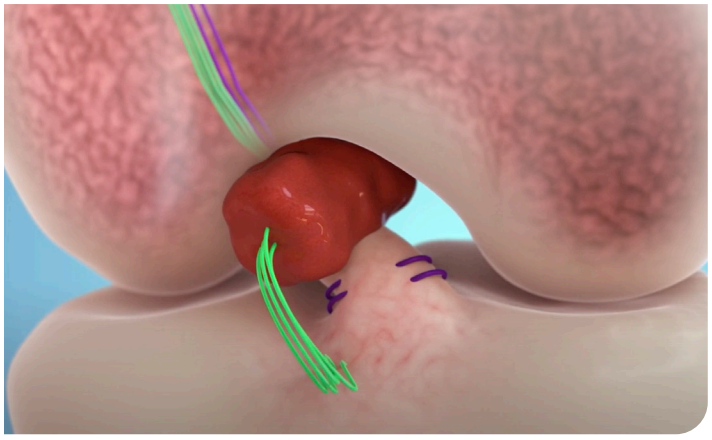

Image courtesy Miach Orthopaedics, Inc.

Rather than replacing the torn ACL, the bridge procedure uses an implant that allows the native ACL to regenerate. The orthopedist injects blood drawn from the patient into the spongey material, permitting a clot to form and stimulate the healing process.

Patients may schedule an appointment with Virtua Orthopedics & Spine at virtua.org/ortho.

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Case Review: Complex Removal of Spinal Mass

Anthony Marshall, a 29-year-old New Jersey police officer and outdoorsman, had experienced neurological symptoms for years. Pain, then sensitivity in the shoulder and neck, progressed to numbness and tingling, and finally clumsiness of the hands and feet. An ED visit and referral to an orthopedist led to MR imaging that showed a large intradural and extradural mass emanating from the C2 right-sided nerve root with compression of the spinal cord.

Marshall came under the care of members of the Penn Medicine Virtua Health Neurosciences Program team who have highly specialized experience in lesions of the spine.

"Mr. Marshall was displaying the kind of classic symptoms of cervical myelopathy for which all evaluating physicians should be vigilant," said Kyle Mueller, MD, Penn Medicine neurosurgeon at Virtua Health. "The patient's growth did not have radiographic indications of metastatic cancer or bone cancer, but required removal to prevent eventual profound myelopathic disability that would come from continued enlargement of the mass."

Patrick Connolly, MD, Penn Medicine neurosurgeon and chief of neurosurgery at Virtua Our Lady of Lourdes Hospital, who led the surgery with Dr. Mueller noted, "Removing a tumor that straddled the spinal cord and then repairing the dura, we wanted to have two pairs of hands and eyes working throughout."

The team accessed the tumor through a posterior cervical incision. They performed a C1 laminectomy and resected the extradural portion of the mass first, in order to create room for the symptomatic intradural portion, find the dural exit point of the tumor, and make an early determination of the relation to the vertebral artery and venous plexus.

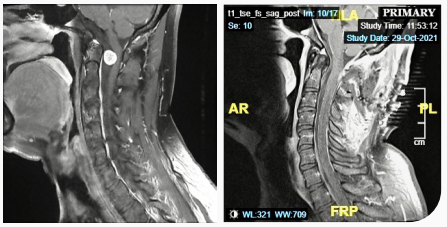
Pathology of the tumor confirmed its benign nature, obviating the need for a more-extensive and higher-morbidity radical operation.

Ahead was a delicate maneuver to remove the tumor's knuckle, which was dorsally displacing the spinal cord. The specialists used an ultrasonic aspirator to resect and define the intradural portion. They created a clean dural opening and rolled the intradural portion out. Mobilizing the spinal cord, they dissected the tumor from the surrounding dura and the ventral portion of the cord—while monitoring cord function, which improved during the operation.

They used small-caliber sutures and a surgical microscope to precisely close the root exit and reconstruct the dura. The traditional method calls for a wide incision in the dura that is difficult to heal. The smaller circular defect and simple linear incision were easier to close. Only one small point on the root sleeve leaked CSF after pressure testing, and the team was able to easily repair it.

Minimum bleeding permitted closing without a drain, decreasing the chance of CSF leakage. Pathology confirmed a schwannoma, a rare, benign type of tumor that grows from Schwann cells of the nervous system. The patient discharged to home three days later, and he has returned to his active job and outdoor life.

Patients may schedule an appointment with a Virtua spine specialist at virtua.org/spine.



C1-C2 mass visible on MR image *(left)* and removed *(right)*