New ACL repair technique harnesses body's own healing abilities

Bridge-Enhanced ACL Repair (BEAR) implant.

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Ellamae Crooks was a striker on the Masters Academy soccer team in Vero Beach when, during a scrimmage last January, she felt the dreaded POP in her knee and she knew it could be the end of her soccer career. The 14-year-old home-schooler from Fellsmere iced the knee and hoped for the best but a visit to the doctor confirmed the injury was serious – an anterior cruciate ligament (ACL) tear.

When Ellamae and her family researched procedures to repair the ACL tear, they learned about a promising new technique called Bridge-Enhanced ACL Repair (BEAR) that harnesses the body's own healing abilities to restore the ligament. They also found out that there was a doctor nearby at Vero Orthopaedics who was trained in this innovative technique.

"Ellamae is young and active, so having a stable ACL is an important factor in continuing her active lifestyle and maintaining the long-term health and function of the knee," said Dr. John Peden, a Mayo Clinic-trained surgeon who performed his first BEAR implant surgery on Ellamae. "Compared to traditional ACL reconstruction, the implant en-

hanced repair is a less invasive procedure that can restore the knee's natural anatomy and function without having to harvest tendon and sometimes bone graft from somewhere else in the body."

Unlike standard reconstruction, the BEAR implant does not require a second surgical wound to remove a healthy tendon from another part of the leg, or the use of a donor tendon. Instead of replacing the torn ACL with a graft, BEAR implants help the body heal itself.

It starts with a bioengineered "scaffold," a sort of organic bridge made from a collagen-based matrix. This scaffold is carefully placed between the torn ends of the ACL, forming a pathway for the body's healing process. The surgeon injects a small amount of the patient's own blood into the implant where it forms a blood clot within the scaffold, securing the torn ends of the ACL together. The clot in turn becomes the foundation for the regeneration of new ligamentous tissue. Cells from the patient's own ACL and surrounding tissue migrate into the scaffold, gradually replacing the clot with new healthy tissue.

"Historically, attempts to repair the ACL have not worked very well because the ACL healing inside the knee joint is disrupted by joint fluid that dissolves the clot," Dr. Peden explained. "What is groundbreaking about the FDA-approved BEAR implant is that the collagen proteins of the implant create the scaffold that bridges the gap to facilitate healing."

Dr. Peden spelled out the range of potential advantages to repairing the ACL ligament with a BEAR implant versus replacing it with human tissue from the patient or a cadaver.

"It preserves your knee's natural anatomy," he explained. "The BEAR implant has been developed as an opportunity to restore your native ACL in its original location, which should enable your knee joint to function more naturally.

"It has the possibility of restoring the torn ACL quality and size similar to your non-injured ACL. Using MRI images, researchers have found that BEAR implant-treated ACLs are the same size and thickness as in the uninjured knee at two years after the surgery.

"Traditional ACL reconstruction can result in persistent weakness at the location where the graft was taken," Dr. Peden continued. "Since the BEAR implant does not require a graft to be used, it has been shown in some clinical trials to result in faster recovery of muscle strength measured at six and 12 months. Also, there are no graft wounds or risk of donor tissue disease transmission.

"Patients treated with the BEAR implant in clinical trials reported earlier confidence in their readiness to return to sports than those who underwent ACL reconstruction, as measured at six months – although resuming sports is not recommended until at least nine months to give the ACL time to fully heal.

"Patients treated with the BEAR implant in clinical trials reported feeling better overall at 1 year after surgery than those who underwent ACL reconstruction," Dr. Peden said. "And clinical trial data suggest that patients treated with the BEAR implant may experience fewer ACL tears in their other leg – known as contralateral ACL tears – at two years."

Young, active patients are the best candidates for the BEAR implant. The ideal candidate is a patient 14 or older with a complete ACL tear who would otherwise be a candidate for the more invasive ACL reconstruction. There has to be sufficient remaining ACL tissue to repair in order for the surgery to work, and the surgery should be performed within 45 days of the injury.

"In clinical trials, the BEAR procedure's success rate was shown to be the same as ACL reconstruction two years after surgery in terms of overall knee stability, function and safety, but the mid- to long-term success rate is still unknown," Dr. Peden concluded.

A comprehensive review and meta-analysis of multiple studies on BEAR implants was performed by Mouton et al. in 2020, which included seven studies and 324 patients. It revealed high rates of ACL healing and favorable clinical outcomes with a pooled ACL integrity rate of 82 percent at the final follow-up.

As for Ellamae, she is feeling great and getting stronger every day with high hopes of returning to play soccer with her team in the fall.

Dr. John Peden received his medical degree from the University of Florida and completed his internship in general surgery at Orlando Regional Medical Center and his residency training in orthopaedic surgery at the Mayo Clinic in Rochester, Minnesota. He then completed a dual fellowship in arthroscopy and sports medicine at Mississippi Sports Medicine and Orthopaedic Center in Jackson, Mississippi. He currently serves as clinical assistant professor for FSU College of Medicine and instructor for the Arthroscopy Association of North America. He is available to see patients in Vero Beach or Sebastian. To schedule an appointment, call Vero Orthopaedics at 772-646-0106. ■