

Putting Damaged Knees Back in Joint

Movement-Enrichment May Be Key in Knee Osteoarthritis Treatment

The ability to stand up and walk across a room is something most people take for granted. But for those with knee osteoarthritis, this seemingly routine activity can be a painful journey.

Morning stiffness in the knee, pain during knee motion, and a feeling that one's knee is slipping or about to give way are tell-tall signs of knee osteoarthritis. It evolves over many years, and develops as a result of knee joint wear and tear, resulting in damaged cartilage or bone structure. This degenerative condition prevents the joint from supporting the knee properly, which can cause physically active people to become sedentary and lead less-healthy lifestyles.

Dr. G. Kelley Fitzgerald, Assistant Professor, Department of Physical Therapy, has worked closely with knee osteoarthritis patients, and has developed some new ideas about how the condition should be treated. Over the past 20 years, exercise therapy has been the treatment of choice for knee osteoarthritis. Regimens consist of range-of-motion exercises for the knee; low-impact aerobics such as walking and riding a stationary bike; and muscular strengthening around the knee and lower portion of the leg. Exercise therapy has proven helpful to people with knee osteoarthritis, but it's far from a panacea. Many graduates of exercise-therapy programs are still not able to participate in athletic activities they once enjoyed. People in this category often experience an osteoarthritic snowball effect -- their knee joints become progressively worse due to lack of high-level movement.

What's more, Fitzgerald and his colleagues in the Department of Physical Therapy observed that almost 50 percent of patients who have knee osteoarthritis complain of knee instability. These patients continue to feel a slipping sensation in their knees, as if they are about to give way, when doing everyday activities such as getting up from a chair or walking up stairs. This suggested to Fitzgerald that exercise therapy alone is not the answer -- supplemental therapy is necessary.

As a doctoral student at the University of Delaware, Fitzgerald worked with athletes who sustained knee injuries. Some of these athletes had ACL injuries and were in jeopardy of not being able to play again until after having surgery. Fitzgerald developed a movement-enrichment program consisting of a series of agility- and perturbation-training exercises to promote improved knee stability during functional activity. The idea was to help these athletes develop compensatory skills by exposing their knees to potentially destabilizing situations.

The agility component of these training exercises consisted of running and stopping routines, cutting drills, and quick changes in direction. The perturbation exercises required patients to stand on tilt and roller boards with one leg, moving forward, backward, and side to side while the physical therapist tried to perturb, or throw off, their

balance. Patients not only strengthened their knees, they learned to compensate for different levels of stress applied. The movement-enrichment program proved so successful, many of the athletes with ACL injuries were able to resume playing and put off surgery until the end of the season.

Fitzgerald hypothesized that a modified version of the movement-enrichment program that proved so successful with young, athletic people could be used with knee osteoarthritis patients. He concluded that because knee osteoarthritis patients tend to be older and less athletic than college football players, the training program needed to be less rigorous, i.e. walking-based instead of running-based.

These toned-down exercises consist of low impact side-to-side movements; carioca – a series of front and backward crossover steps; pylon drills in which patients walk to a pylon, stop, and walk backwards; walking drills that emphasize random changes in direction; and perturbation training where patients try to balance themselves on tilt and roller boards with both legs.

On the Right Track – Case Studies

Fitzgerald worked closely with Tara Ridge, a staff therapist at the University of Pittsburgh Center for Sports Medicine and a doctoral student in the Rehabilitation Science program, to incorporate the movement enrichment program into the care plans for her patients with knee osteoarthritis at the center. Two success stories lead Fitzgerald to believe his movement-enrichment program is a key addition to exercise therapy programs in knee osteoarthritis treatment.

A 73-year-old female patient of Ridge's was an avid golfer and tennis player. She had suffered from knee osteoarthritis for a couple years, but was able to control it by taking medication and refraining from athletics when her knee pain flared up. Finally, her condition got the best of her when her knees began to feel as if they were giving way during normal, everyday activities like walking and getting up from a chair. She was forced to quit playing golf and tennis, at which point she came to Ridge for help. Ridge and Fitzgerald collaborated on designing a movement enrichment program to meet the patient's needs.

The woman went through 12 treatment sessions over the course of six weeks, each session lasting 45 minutes to an hour. With each session her knees gradually improved, and after six weeks her knee strength and sense of confidence were restored. By continuing the exercises independently, she has come full-circle. Her knees no longer feel like they're giving way during normal, everyday activities, she has begun walking three miles every day and returned to the golf fairways without any problems. Playing tennis still causes her some pain -- not surprising given the amount of impact knee joints sustain on a tennis court -- but she has resumed playing on a regular basis.

“I believe she would have gotten better with a traditional treatment regimen, but she probably wouldn't have been able to return to recreational activities (without the movement-enrichment program),” says Fitzgerald.

Another success story Fitzgerald cites is that of a 69-year-old male patient with a passion for hiking. It initially appeared the patients' next hike would be into a hospital operating room for total knee-replacement surgery -- the worst case scenario for people with knee osteoarthritis. He experienced slipping and giving-way sensations in his knees, coupled with severe pain. Before submitting to a surgeon's scalpel, however, the man made a series of visits to Ridge. After a six-week treatment program, he decided to put his much-improved knees to the test by hiking in the Swiss Alps -- a trip that was only a pipedream a couple months earlier. His alpine sojourn turned out so well, and his knees improved so dramatically, that his knee-replacement surgery was no longer deemed necessary.

Fitzgerald is applying to the NIH for a grant enabling him to conduct randomized trials to determine if adding agility and perturbation techniques improves the overall effectiveness of exercise therapy. He believes helping knee osteoarthritis patients return to an active lifestyle improves their quality of life, which he thinks is especially important for our steadily aging society. Above and beyond everything else, Fitzgerald believes the key ingredient to success is remaining active after treatment.

“If we make it possible for them to remain active and participate in higher-level recreational activities, there's a good chance of delaying disability or even preventing it all together.”

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