'No Pain, No Gain' True in Strength Training

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FROM THE WORLD CONGRESS ON OSTEOARTHRITIS

SAN DIEGO – Induced knee pain appears to have improved strength training in a small, Danish randomized trial.

Researchers injected the right knee infrapatellar fat pads of 13 healthy subjects in their mid-20s with painful, hypertonic saline. Immediately afterward, participants did three sets of leg presses and knee extensions. After three sessions per week for 8 weeks, their right quadriceps were 22% stronger than at baseline. Fourteen controls, injected with nonpainful isotonic saline, increased quadricep strength by 7% (*P* less than .0001).

Common wisdom holds that pain diminishes muscle function, inhibits strength training, and may prevent rehabilitation in patients with knee problems, including osteoarthritis, but "no one has ever proven that is actually the case," said lead study author Tina Sorensen, a doctoral candidate at the Institute of Sports Science and Clinical Biomechanics at the University of Southern Denmark in Odense.

The results suggest "maybe it's not that bad to exercise with pain, at least if it's not caused by inflammation"; perhaps they also hint at a role for induced pain in some settings, said Ms. Sorensen, who is a physiotherapist. The researchers said they are interested in seeing if their early results hold up in patients with actual knee problems.

VITALS

Major Finding: After 8 weeks of strength training, subjects whose knees had been injected with a painful saline solution before each workout had quadriceps that were 22% stronger; the quadriceps of peers who didn't get painful injections were 7% stronger.

Data Source: Randomized, controlled trial involving 27 people.

Disclosures: Ms. Sorensen said she has no disclosures. The work was supported by the Association of Danish Physiotherapists.

Loads used in training were 80% of a given subject's maximum repetition strength, assessed weekly and without pain. Participants worked each set to the point of muscle fatigue, usually 8-12 repetitions, and rested a minute between sets. The groups were evenly matched, with no significant differences in height, body mass index, or baseline strength. There were 10 men in the pain group and 6 in the control group, but as with other factors, the difference was not statistically significant.

The injections (1 mL of saline under ultrasound guidance) came after a 10-minute warm-up on a stationary bicycle. The pain from the hypertonic shots diminished as subjects worked through their sets, starting on average at about 25 mm on the 100-mm visual analog pain scale and ending at about 10 mm. Strength was assessed weekly 30 minutes after training.

After 8 weeks, the right legs of subjects in the pain group were 24.6% stronger at 60 degrees of knee extension, 21.6% stronger at 120 degrees, and 19.6% at 180 degrees. Subjects in the control group were 7.5% stronger at 60 degrees of knee extension, 5.0% at 120 degrees, and 8.2% at 180 degrees.

"It could be that when you have pain, your type 1 muscle fibers [the endurance fibers,] are inhibited, and your type 2 [power and speed] fibers are easily recruited, which could explain why the pain group had the larger increase in muscle strength," Ms. Sorensen said at the meeting, which was sponsored by the Osteoarthritis Research Society International. ■

Hand OA Questionnaires Are Not Comprehensive

SAN DIEGO – Hand osteoarthritis causes a wide range of problems, but popular functional assessment questionnaires may miss many of them, Norwegian researchers have found.

In response to a survey question, 211 Norwegians with hand osteoarthritis (OA) listed 311 tasks their OA made more challenging. Wringing out cloths and opening jars was a struggle for more than half. A third or more cited buttoning and unbuttoning clothes, as well as carrying suitcases and other heavy objects. More than 20% reported having a hard time peeling raw vegetables.

VITALS

Major Finding: When asked, 211 Norwegians with hand osteoarthritis listed 311 tasks their OA made difficult.

Data Source: Survey conducted using the Australian/Canadian Hand Osteoarthritis Index.

Disclosures: The study was paid for by the Norwegian Occupational Therapy Association and the Oslo Rheumatism Association. Dr. Fernandes said she has no disclosures.

Those items are among the nine tasks listed on the widely used Australian/Canadian (AUSCAN) Hand Osteoarthritis Index questionnaire, said lead investigator Linda Fernandes, Ph.D., a physiotherapist at Diakonhjemmet Hospital in Oslo.

But more than half of the Norwegian sample had a hard time opening bottles, too.

About a third said writing by hand and slicing bread were tough. About 20% or more said knitting, putting on socks, vacuuming, carrying shopping bags, zipping pants, and wiping down floors, among other chores, were problems, and some patients listed those items as priorities. None are on the AUSCAN, she said at the congress, sponsored by the Osteoarthritis Research Society International.

Patients did not mention problems with opening doors and turning on faucets, likely because doors in Scandinavia have turning handles, not doorknobs, and most sinks have a single lever to control hot and cold water. These items are on the AUSCAN, Dr. Fernandes said.

"The outcome measures we have today," which also include Dreiser's Functional Index, "are all expert opinion–based questionnaires. They haven't really asked the patients themselves" about their struggles, she said.

She and her colleagues said they hope to develop a more comprehensive questionnaire.

Meanwhile, they said, physicians should go beyond current questionnaires to learn more about the challenges their patients face. Lid handles to open jars, as well as grip-strength and range of motion exercises, especially for the thumb, may also help patients, Dr. Fernandes said.

The study involved 201 women and 10 men, average age 63 years, recruited consecutively as they presented to rheumatology clinics in Oslo and Trondheim.

They had a mean disease duration of 12.5 years and 8.6 affected joints; 64% had a comorbidity, 49% were employed. ■

Osteotomy Surgery on One Knee Stresses the Opposite Joint

SAN DIEGO – Unilateral, medial, opening-wedge high tibial osteotomy on one knee increases joint load on the other.

The procedure is used to correct varus malalignment, according to researchers at the University of Western Ontario, London. The findings apply to a subset of opening-wedge high tibial osteotomy (HTO) patients, those who present initially with significant bilateral varus, but in whom symptoms were severe enough to require surgery in only one knee.

VITALS

Major Finding: At 2 years after a unilateral, opening-wedge high tibial osteotomy, 38 patients experienced a mean 0.25% body weight times height increase in peak knee adduction moment in the nonoperative limb.

Data Source: Comparison of baseline values to 2-year postop values.

Disclosures: The study was funded by the Canadian Institute of Health Research. Mr. Boulougouris said he had no disclosures.

In 38 such patients, 2 years after surgery "we noted a 0.25% [of body weight times height] increase in peak knee adduction moment in the non-operative limb," as well as a slight increase in vertical ground reaction force, said lead author and physiotherapist Angelo Boulougouris, a biomechanics doctoral candidate at the school. The external knee adduction moment measured during gait is an indicator of tibiofemoral joint osteoarthritis progression.

"The major point is to pay attention to what's happening to the opposite knee," he said. An unloader brace, for instance, might be appropriate for the nonoperative knee, among other possible interventions, he said. An unloader brace is designed to lessen the stress on a knee with medial compartment knee osteoarthritis. This use of the unloader brace would be to prevent development of knee OA rather than to ease the discomfort associated with established disease. During HTO, a wedge of the cancellous bone allograft is placed in the proximal end of the tibia, correcting both varus deformity and weight distribution through the knee.

Of the 38 patients, 32 were men, the average age was about 50 and average body mass index (BMI) about 27 kg/m^2. Varus malalignment in the operative limb was about 11 degrees and Kellgren-Lawrence grades ranged from 1 to 3. Varus malalignment was about 8 degrees in the nonoperative limb, with Kellgren-Lawrence grades ranging from 0 to 1.

Patients did well overall, reporting decreased pain and improved quality of life at 2 years. Varus malalignment was corrected in the operative limb, and unchanged in the nonoperative limb.

Knee adduction moment had also significantly decreased on the operative side (mean change, –1.99 % of body weight times height), but increased slightly on the nonoperative side. Gait changes also increased load on the nonoperative knee, including increased gait speed (mean change, 0.08 m/sec) and decreased trunk lean to the stance-phase limb (mean change, –1.43 degrees). The findings were statistically significant. ■