Loss of Muscle Power Discovered After Unilateral Knee Replacement

Knee replacements are common among older adults with painful joint arthritis. It has been assumed that the decrease in pain after recovery from joint replacement surgery translates into improved motion, strength, and function. But Physical Therapists working with these patients have noticed problems with climbing stairs and a slower walking speed long after recovery from rehab.

Rehabilitation researchers around the world have confirmed these observations. Measures of muscle strength, CT scans showing muscle cross section, walking speed, and time to complete stairs have provided quantifiable evidence to back up this finding. Now similar results have been observed in patients who have a unilateral knee replacement (UKR). Unilateral knee replacement refers to an implant for half of the joint. Usually the medial side of the knee (closest to the other leg) is replaced most often because that's where most of the wear and tear occurs in many patients.

In this study, Physical Therapists from Finland take a look at just how bad is this muscular weakness and loss of power in the business of rehabilitation, they need to pay attention to this problem in their patients. They measured strength of flexor and extensor muscles of patients who had a unilateral knee replacement within the last 18 months. Adults in good health between the ages of 55 and 75 years old were selected to participate.

A special tool called an isokinetic dynamometer was used to measure muscle strength at different speeds (60 degrees of motion per second, 180 degrees per second). The operated knee was compared to the nonoperated side. Some, but not all, of the patients did have arthritis in the nonoperated knee, which could affect the results.

In addition to analyzing peak muscle power, CT scans were taken of the muscle cross section. These pictures allowed researchers to measure muscle bulk. Loss of muscle bulk called atrophy can result in weakness and loss of joint stability. Walking speed over a 10-meter distance and time negotiating 10 stairs (up and down) were also recorded. In all of the analysis, the researchers calculated to see if age, sex, or time since the surgery made a difference in the final results.

Everyone had a loss of strength in the operated leg compared to the nonoperated side. Both the knee flexor muscles and extensors were weaker. When the extensor muscles on the operated side and the flexors on the nonoperated side were weak, patients had a more difficult time going up stairs. This was true for all ages (men and women alike). Weak flexors and extensors on the operated side meant greater difficulty going down stairs. And anyone with significant weakness also had a smaller cross-section of the affected muscles indicating muscle atrophy.

These findings so long (months) after the primary surgery are of concern. The risk of falls increases when there are deficits muscle power. Even recoverying from a stumble can be a problem because muscle power and coordination are linked. Decreased power means altered coordination, which can result in an inability to regain balance. When muscle weakness occurs after a unilateral knee replacement, walking speed can be affected but not as much as stair climbing, which seems to suffer the most. The nonoperated leg seems able to help compensate with the walking but more power and force are needed in the muscles of the operated leg for stair climbing. Even with help from the other side, it may not be enough for the task.

Physical Therapists can use this information to screen patients more carefully after unilateral knee replacement. Discovering persistent muscle weakness and loss of muscle power can be addressed with an exercise program. Improving mobility and function for these patients while preventing complications and disability from falls is an important goal for all knee joint replacements -- whether it is a complete replacement or a partial replacement with the unilateral implant.