Sit-To-Stand: More Difficult When There's Back Pain

Sometimes having low back pain can make even the simplest tasks difficult. Take for example, coming to a standing position from sitting. A loss of muscle power can make the sit-to-stand task much harder to accomplish. And that's a problem because the sit-to-stand motion is incorporated into many of our daily activities. What can be done about this?

Well, before an exercise program can be determined and prescribed, it is important to figure out where's the problem? Research has shown that low back pain alters the passive power flow in the lower quadrant. But is it a lack of power transfer from the spine to the pelvis or from the pelvis to the legs? What causes the change in power dynamics? What can be done about it? And for that matter, which came first: the low back pain or the change in power balance?

These questions were addressed in this study by a group of Australian Physical Therapists. They examined three-dimensional (3-D) movements of the spine-pelvis-thigh-leg segments of three groups. There was one group of normal, healthy adults without back pain, one group of low back pain sufferers without leg pain, and a third group of adults with back and leg pain. Pain shooting down the leg accompanied by back pain is called sciatica or radiculopathy.

Subjects were instructed to stand up from a sitting position while being monitored by force plates under the feet and sensors attached to the low back, pelvis, thigh, and foot. A computer program recorded the data, measured the power flow and velocity of the joints, and analyzed the flow of power from segment to segment. Patients reported if and when pain increased during the activity. This information was then compared to the timing of the movements.

There's no doubt that low back pain limits lumbar spine motion, hip motion, and the coordination between the two. This has been proven in previous studies and confirmed by the results of this study. It may be a protective response to avoid loading spinal structures. But it definitely causes a change in how energy is transferred between bone and soft tissue in the spine, pelvis, and leg.

And that inefficient energy flow or transfer then places even more demand on the spine. A vicious cycle gets started of back pain-altered biomechanics-soft tissue injury-and more back pain. Without enough transfer of energy and muscle power, everyday activities such as standing up from a sitting position become difficult, if not impossible due to pain.

With the loss of power in the legs, the workload placed on the spine increases. Simple tasks become more energy-demanding and energy-consuming. Corrupted muscle coordination adds to the strain. Both groups with back pain (with or without leg pain) experienced the same phenomenon. There was no difference between the two groups. Patterns of power were the same whether or not the subjects with back pain also had leg pain. The control group (subjects without back pain) did not have any of these findings.

Now that we know there is a problem with transfer of energy in patients with low back pain that affects function, what's next? The authors suggest several steps. First, find out was it the chicken or the egg? In other words, is back pain the cause of the abnormal power balance? Or does the compromised transfer or energy and power imbalance cause the back pain? We still don't know this.

Next, find out what each group of trunk muscles contribute to power flow. These may be key in setting up a successful rehab program to address spine strengthening. When this is determined, then specific exercise programs can be established and the results measured to confirm the effectiveness of the program for low
back pain patients.

Right now, it's still not clear what the contribution of different trunk muscles is to power flow. And it's not clear that just strengthening the muscles will do the trick. It may be necessary to restore normal joint reaction forces, speed of movement, and spinal joint proprioception (joint sense of position) before being able to end the cycle of back pain and altered power flow.