

Combating Joint Degeneration With Orthotics by Dr. Mark Charrette

Degenerative joint disease (osteoarthritis) increases in frequency as we age. As society gets older, therefore, chiropractors will encounter more patients afflicted with painful joint conditions. Whenever degenerative changes affect weight-bearing joints, especially in the spine and lower extremities, methods to reduce the damaging effects of heel-strike shock on the musculoskeletal system should be implemented. The use of custom-made, flexible orthotics can help alleviate present symptoms in these patients while also reducing the potential for future injury.

Muscles and connective tissues are the body's first line of natural shock absorbers, but cartilage and the latticework of trabeculae in bone also absorb a significant amount of external forces. Even under normal biomechanical conditions, the dynamic forces to which the feet, legs and spine are subjected during gait tend to cause a slow, progressive stiffening of these natural shock absorbers. This weakening and increased stiffness eventually leads to clinical evidence of articular cartilage degeneration and osteoarthritis. Heel pad stiffness has also been associated with **plantar heel pain**.¹

Forces and Shocks



When a joint is exposed to cyclic vertical forces, the appearance of degenerative changes is essentially only a matter of time.²⁻³ These repetitive forces cause a fatigue-failure in the joint tissues, a well-known phenomenon that includes alterations in both the **articular cartilage**⁴ and in the cancellous **subchondral bone**.⁵ When this type of intermittent dynamic loading is combined with biomechanical faults, previous injury to a joint, or a rigid, non-yielding walking surface, degenerative changes progress rapidly and symptoms frequently develop.

The spine and lower extremity joints are subject to the repetitive impulses that are created with each step during walking. At heel-strike - the moment of impact when the heel makes contact with the ground - a **shock wave** is propagated through the entire musculoskeletal system.⁶ This **shock wave passes through the skeleton** at over 200 miles per hour and jars the base of the brain up to half a millimeter in normal walking.⁷ When a patient has degenerative changes in the spinal discs and joints, this shock-wave force can be the cause of persistent painful and stiff joints.

Decline of the Body's Defenses

In normal situations, the shock of heel strike is at least partially absorbed by a series of tissues and joints. The heel fat pad is the body's first line of defense.⁸⁻⁹ However, factors such as normal aging, vascular changes, injury, and chronic high pressures can break down the fat and connective tissue that provide the integrity of the **fat pad**.¹⁰

The normal biomechanics of pronation at the subtalar joint, along with internal rotation of the tibia and slight knee flexion, also combine to dissipate some of the heel-strike forces. This interaction of joints is a delicate mechanism and biomechanical faults such as excessive pronation frequently limit the amount of absorption possible.¹¹

The soft tissues of the pelvis and spine - including the intervertebral discs, the pelvic and paraspinal muscles, and the elastic connective tissues - provide significant additional shock absorption. Once again, aging can result in poor elasticity, disc thinning and significantly less attenuation of shock. The end result is a gradual decline in the skeleton's capacity to handle the forces of daily living, including heel strike.

Helping Absorb the Shock

Fitting patients with shock-absorbing orthotics designed to assist the body in dealing with the forces of walking (and running) can reduce or eliminate a significant source of joint stress and excessive strain. This intervention results in a significantly better response to chiropractic care whenever degenerative joint disease is present. Orthotics are helpful in two major ways: they can include viscoelastic polymers to decrease impact stress, and they can support the joints and reduce biomechanical stress. Orthotics using these materials are designed to take the place of the inadequately functioning body tissues by absorbing the excessive forces of daily living, and preventing (or at least slowing) further breakdown. **Shock-absorbing viscoelastic polymers**, along with improved biomechanics at the subtalar and knee joints, can achieve a substantial decrease in the amount of skeletal shock to joints.¹² An additional recommendation for aging patients with loss of **heel pad compliance** is the use of a heel cup, which improves heel pad function by preventing lateral and medial bulging, thereby maintaining pad thickness.⁸

Protect and Support

Patients who have degenerative joint disease - or those having any degenerative changes in weight-bearing joints - should receive optimal chiropractic care, including custom-made orthotics made with shock-absorbing materials. The viscoelastic materials that are available are lightweight, hold up well, and can significantly reduce the loads on degenerated joints from normal daily activities.

References

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