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Diurnal variations in the stresses on the lumbar spine.

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Abstract

Two complementary experiments were performed, the first on living people and the second on cadaveric spines. In the first experiment, electronic inclinometers were used to measure the range of lumbar flexion of 21 volunteers in the early morning and in the afternoon. The results showed that the range of movement increased by 5 degrees during the day. In the second experiment, cadaveric lumbar motion segments were creep loaded to simulate a day's activity and their bending properties were measured before and after creep. The results showed that creep loading reduces the spine's resistance to bending (the effect being particularly marked in the disc) and increases the range of lumbar flexion by 12.5 degrees. The results of the two experiments were combined to show that in life, forward bending movements subject the lumbar spine to higher bending stresses in the early morning compared with later in the day. The increase is about 300% for the discs and 80% for the ligaments of the neural arch. It is concluded that lumbar discs and ligaments are at greater risk of injury in the early morning.

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