QUANTIFYING FRACTURE MOVEMENT IN A TIBIAL FRACTURE: SURROGATE MODEL VERSUS CADAVER LEG

P. Calder; P. Koroma; J. Wright; D. Goodier; S. Taylor; G. Blunn; M. Moazen

Aim

To quantify the micro-motion at the fracture gap in a tibial fracture model stabilised with an external fixator.

Method

A surrogate model of a tibia and a cadaver leg were fractured and stabilised using a two-ring hexapod external fixator. They were tested initially under static loading and then subjected to vibration.

Results

The overall stiffness of the cadaver leg was significantly higher than the surrogate model under static loading. This resulted in a significantly higher facture movement in the surrogate model. In the surrogate model there was no significant difference between the displacement applied via the vibrating platform and the fracture movement at the fracture gap. The fracture movement was however found to be statistically lower during vibration in the cadaver leg.

Discussion

The significant difference in stiffness seen between the surrogate and cadaveric model is likely due to multiple factors such as the presence of soft tissues and fibula, including the biomechanical differences between the frame constructs. The fracture movement seen at 200N loading in the cadaveric leg was approximately 1mm which corresponds to partial weight bearing and a displacement shown to promote callus formation. During vibration however, the movements were far less suggesting that micromotion would be insufficient to promote healing. It may be proposed that soft tissues can alter the overall stiffness and fracture movement recorded in biomechanical studies investigating the effect of various devices or therapies.