

## 論 文 要 旨

### **Evaluation of miniscrew stability using an automatic embedding auxiliary skeletal anchorage device**

#### **ABSTRACT**

**Objectives:** The purpose of this study was to clarify the *in vivo* effect of an automatic embedding device on miniscrew stability.

**Materials and methods:** Forty-two miniscrews were implanted into rabbit femurs. The miniscrews with the novel auxiliary device formed the auxiliary group (n=11 at 4 weeks; n=11 at 8 weeks) and the miniscrews without the auxiliary device formed the nonauxiliary control group (n=9 at 4 weeks; n=11 at 8 weeks).

Cortical bone thickness, distance from the cortical bone surface to the miniscrew head, and implantation depth of the spike were measured using micro-computed tomography. The mechanical retention force was evaluated by measuring the displacement of the miniscrew head after it was loaded perpendicular to its long axis. In the lateral displacement test, effects of the auxiliary (with vs. without auxiliary), and time (4 vs. 8 weeks) were assessed using the Brunner-Langer nonparametric analysis of longitudinal data in factorial experiments.

**Results:** The mean implantation depth of the spike in the auxiliary group at 4 and 8 weeks was 0.28 mm (median: 0.33; SD: 0.12) and 0.37 mm (median: 0.33; SD: 0.19), respectively. The retention force was approximately 2.0 to 2.8 and 1.6 to 1.8 times greater in the auxiliary group than in the nonauxiliary group at 4 and 8 weeks, respectively.

**Conclusions:** The auxiliary device improved the mechanical retention force without the need to increase miniscrew length or diameter. This may enable the safe use of miniscrews in difficult areas.