In Vitro Biomechanical Evaluation of a New Rod-Screw Implant System for the Posterior Occipito-Cervical Instrumentation

Balkan Cakir(1)(B), H-J Wilke(2)(O), L. Claes(2)(O), W. Puhl(1)(O), M. Richter(1)(O)

Institution(s)
1) Department of Orthopaedics and SCI;University of Ulm, Germany
2) Department of Orthopaedic Research and Biomechanics;University of Ulm, Germany

Introduction: Posterior instrumentation of the occipito-cervical spine is established in different indications. The use of rod-screw systems improved posterior instrumentation due to optimal screw position adapted to the individual anatomic situation. However there are still some drawbacks concerning the different implant designs. Therefore a new modular rod-screw implant system was developed to overcome some of the drawbacks of established systems. The aim of this study was to evaluate whether posterior internal fixation of the occipito-cervical spine with the new implant system improves primary biomechanical stability.

Methods: Three different internal fixation systems were compared in this study: 1. CerviFix system 2. Olerud cervical rod spinal system 3. Newly developed neon occipito cervical system. Eight human cervical spine C0-C5 specimens were instrumented from C0 to C4 with occipital fixation, transarticular screws in C1/2 and lateral mass or pedicle screws in C3 and C4. The specimens were tested in flexion/extension, axial rotation, and lateral bending using pure moments of ±2.5 Nm without axial preload. After testing the intact spine the different instrumentations were tested after destabilising C0/C2 and C3/C4.

Results: Primary stability was significantly increased in all load cases with the new modular implant system compared to the other implant systems. Pedicle screw instrumentation tended to be more stable compared to lateral mass screws, nevertheless significant differences could be observed only for lateral bending. As the experimental design precluded any cyclic testing the data represent only the primary stability of the implants.

Conclusions: In summary this study showed that posterior instrumentation of the cervical spine using the new neon occipito cervical system improves primary biomechanical stability compared to the cervifix system and the olerud cervical rod spinal system.

Keywords:

Address: RKU - Orthopadische Klinik mit
Querschnittgelahmtenzentrum der Universität Ulm
Oberer Eselsberg 45, D-89081 Ulm/Germany

Fax: +49-731-1103

E-Mail: B.Cakir@web.de