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Abstract

Abstract No.	663
Abstract Title *	Two-Component Fusion Cage Improves Bone-Implant Alignment Without Compromising Stability
Institution(s) as cited in the program *	1 University of Ulm, Institute of Orthopaedic Research and Biomechanics, Ulm, Germany 2 FBC Device ApS, Aarhus, Denmark 3 Aarhus University Hospital, Orthopaedic Research Laboratory, Aarhus, Denmark
Category *	Basic Science
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Abstract-Text

Introduction A novel two-piece anterior lumbar interbody fusion device (ALIF) allows for limited temporary in vivo movement of the treated segment so that the patient's body by itself can determine the appropriate position for fusion. A potential benefit maybe the improvement of the bone-implant interface with a positive impact on sagittal balance and clinical outcomes. The aim of this study is to analyze the stability of the treated segment instrumented with the two-component ALIF, compared with conventional one-piece ALIF as stand-alone. Furthermore, the relative motion between the implants and the adjacent endplates was investigated. Methods Seven lumbosacral (L3-S1) human specimens (age 50-60 years, 4 males and 3 females) were tested. The motion segment L4-L5 was instrumented with a two-component ALIF and a one-piece standard ALIF as benchmark. The range of motion of the specimens without, and after instrumentation with both implants was tested in an alternated sequence under application of pure moments (±7.5 Nm) in flexion/extension (F/E), lateral bending (LB), and axial rotation (AR). Fluoroscopic videos were captured during motion in the sagittal and frontal plane to determine the relative motion between the implant and the adjacent endplates. Paired student's t-tests were performed to determine statistical significance at a p=0.05 level. Results No significant difference between the constructs was found in flexion/extension, whereas for the two-piece ALIF a small and consistent higher range of motions in lateral bending and axial rotation was significant. (ROM (mean±SD) for one-piece/two-piece ALIF: F/E: 10.4°±2.6°/11.8°±3.7°, LB: 5.5°±3.4°/6.7°±3.2°, AR: 4.2°±2.4°/5.5°±2.4°) Relative motion between implants and bone was significantly smaller for the two-component implant. This trend was similar for both planes e.g. in flexion/extension 3.1°±1.6° for the two-piece ALIF compared to 10.5°±2.7° for the one-piece implant. Discussion We found a significantly reduced relative motion at the bone-implant interface with the two-piece fusion implant, which theoretically can improve bony healing and establish better sagittal balance and in the long-term may prevent the risk of implant subsidence. Further, the two-piece implant allowed a slightly more range of motion.

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Portrait picture	prof._dr._hans-joachim_wilke.jpg
Short CV *	Prof. Dr. Hans-Joachim Wilke , Ph.D. is the Co-Director of the Institute for Orthopaedic Research and Biomechanis at the University of Ulm and head of the spine research. Prof. Wilke is mechanical engineer, has received his Ph.D. in biomechanics and has become lecturer and professor for experimental surgery. Since 2001 he is Deputy Editor of the European Spine Journal responsible for basic research. He has been secretary general from 1996-2006 and afterwards 2008-2009 president of the German Spine Society. 2009-2010 he was the president of the Spine Society of Europe. Since 2009 he is also the scientific representative of the International Society of the Study of the Lumbar Spine. He authored and coauthored more than 196 peer-reviewed publications, ca. 50 book-chapters, and he has been editor of 5 books.

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