Instrumented Vertebral Body Replacements

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Severe compression fractures of a vertebral body or a tumour in the region of the spine sometimes require the replacement of a vertebral body by an implant. The loads on such an implant are not well known. In order to measure these loads, the commercially available vertebral body replacement "SYNEX" was modified. It allows the in vivo measurement of three force components and three moments acting on the implant. The 9-channel telemetry transmitter developed in our biomechanics laboratory was placed into the cylinder of the implant together with six load sensors and a coil for the inductive power supply.

Measurements

Instrumented vertebral body replacements were implanted in five patients since 2006. Implantations in up to 10 patients are planned. The implant loads, which probably correlate with the spinal load, will be measured for many activities of daily living. The example shows the implant loads for elevation of the right arm with a weight of 50 N in the hand. This causes an increase of the resultant implant force from about 400 N to nearly 900 N. Further results of the load measurements can be found in the database OrthoLoad.

Patients

Patients with instrumented vertebral body replacements during load measurements.

Publications

2014
Methods for Avoiding or Reducing High Spinal Loads in Everyday Life.
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How does the way a weight is carried affect spinal loads?
Rohlmann A, Zander T, Graichen F, Schmidt H, Bergmann G
Ergonomics. 2014 57(2):262-70, 1.61 Impact Factor
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In vivo measurements of the effect of whole body vibration on spinal loads.
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Loads on a spinal implant measured in vivo during whole-body vibration.
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2007
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