Real time measurement of pedicle screw pull-out force

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Technology description

INVENTION NOVELTY

This technology can measure the tensile forces applied to the pedicle screw and provide real time feedback before reaching screw pull-out force.

VALUE PROPOSITION

Pedicle screw fixation is the most common method used to achieve spinal fusion for surgical treatment of spine deformity. Pedicle screws are used at each vertebral segment to instrument the spine and reduce the deformity by connecting the screws to rods. Large forces are placed on the screws while reducing the spinal deformity potentially leading to instrumentation failure as screw loosening, and screw pullout. This device will allow the surgeon to know when to stop the reduction maneuver before too much force is applied compromising the fixation and causing screw pull-out.

TECHNICAL DESCRIPTION

Fixation failure may occur intra-operatively through a number of mechanisms: screws may toggle in osteoporotic bone and subside or they may fail acutely in pullout or pedicle fracture when too much force is applied on them. To date surgeons have only little information regarding how much force can be safely applied to pedicle screws while reducing the spinal deformity before compromising screw purchase into pedicle bone leading to screw pullout. Our objective would be to study the correlation between the force applied to reduce the deformity (reduce rod into the screw head) and the pullout force of the screw out of the pedicle bone. Our goal is to develop a device that provides real time feedback during reduction maneuvers of the spinal deformity to warn the surgeon before reaching the critical screw pull out force.

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