Cortical trajectory screw

Cortical trajectory screw constructs, developed as an alternative to pedicle screw fixation for the lumbar spine, have similar in vitro biomechanics. The possibility of one screw path having the ability to rescue the other in a revision scenario holds promise but has not been evaluated.

Ten fresh-frozen human lumbar spines were instrumented at L3-4, 5 with cortical trajectory screws and 5 with pedicle screws. Construct stiffness was recorded in flexion/extension, lateral bending, and axial rotation. The L-3 screw pullout strength was tested to failure for each specimen and salvaged with screws of the opposite trajectory. Mechanical stiffness was again recorded. The hybrid rescue trajectory screws at L-3 were then tested to failure.

Cortical screws, when used in a rescue construct, provided stiffness in flexion/extension and axial rotation similar to that provided by the initial pedicle screw construct prior to failure. The rescue pedicle screws provided stiffness similar to that provided by the primary cortical screw construct in flexion/extension, lateral bending, and axial rotation. In pullout testing, cortical rescue screws retained 60% of the original pedicle screw pullout strength, whereas pedicle rescue screws retained 65% of the original cortical screw pullout strength.

Cortical trajectory screws, previously studied as a primary mode of fixation, may also be used as a rescue option in the setting of a failed or compromised pedicle screw construct in the lumbar spine. Likewise, a standard pedicle screw construct may rescue a compromised cortical screw track. Cortical and pedicle screws each retain adequate construct stiffness and pullout strength when used for revision at the same level [1].

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Calvert GC, Lawrence BD, Abtahi AM, Bachus KN, Brodke DS. Cortical screws used to rescue failed lumbar pedicle screw construct: a biomechanical analysis. J Neurosurg Spine. 2015 Feb;22(2):166-72. doi: 10.3171/2014.10.SPINE14371. Epub 2014 Dec 5. PubMed PMID: 25478820.