Dynamic stabilization

Each dynamic stabilization should preserve motion at the operated segment as well as reduce a load on the disc and facet joints.

One of the methods to achieve this is the implantation of interspinous devices between lumbar spinous processes.

The concept of dynamic stabilization has been replaced by that of dynamic neutralization of hypermobility, with the intention of clarifying that the primary aim of this kind of system is not the preservation of the movement, but the dynamic neutralization of the segmental hypermobility which is at the root of the pathological condition.

Non-fusion or motion preservation back surgery, which aims to provide stabilization to the lumbar spinal units (SUs), while maintaining their mobility and function. Risk of potential complications of traditional fusion methods (infection, CSF leaks, harvest site pain, instrumentation failure) are reduced, particularly transitional disease (i.e., the biomechanical stresses imposed on the adjacent segments, resulting in delayed degenerative changes in adjacent facet joints and discs). Dynamic stabilization modifies the distribution of loads within the SU, moving them away from sensitive (painful) areas of the SU.

Whether decompression alone or decompression with dynamic stabilization offers better surgical outcomes remains unclear. Tosic et al. compared the clinical and radiologic results of patients with single-level lumbar spinal stenosis and grade 1 spondylolisthesis undergoing microsurgical decompression alone or decompression with transpedicular dorsal dynamic stabilization.

They retrospectively analyzed 20 patients undergoing microsurgical decompression and dorsal dynamic transpedicular stabilization using polyetheretherketone (PEEK) rods in one center from 2011 to 2017. Twenty patients with the same diagnosis undergoing microsurgical decompression alone were used as controls. Reoperation of the index and neighboring segments, back/leg pain, neurologic deficits, and the use of pain medication were assessed. For stabilization patients, radiographic progression of degeneration in the neighboring segments, listhesis degree in the index segment, and implant failure were assessed.

All patients had good clinical outcomes at 3 and 12 months postoperatively. In stabilization patients, the visual analog scale (VAS) score for leg pain decreased from 5 points (median) to 1.6 at 3 months and 0.6 at 1 year postoperatively. In controls, the VAS score improved from 4.8 points to 1.1 at 3 months and 0.3 at 1 year postoperatively. The VAS score for back pain in stabilization patients decreased from 7.6 points (median) to 1.7 at 3 months and 0.1 at 1 year postoperatively. In controls, it decreased from 7.7 points to 1.1 at 3 months and 0.2 at 1 year postoperatively. In patients with additional dynamic stabilization, a longer hospital stay (stabilization group: 8.7 ± 4.1; control: 6.2 ± 1.6 days), longer operative time (stabilization group: 132.7 ± 41.3; control: 83.2 ± 31.7 minutes), and higher complication rates (revision surgery performed in two stabilization patients) were found.

No indications in this study showed that additional dynamic stabilization with PEEK rods offers any advantage over decompression alone [1)].

Most devices are minimally invasive or percutaneous, thus accessible to radiologists' interventional practice [2].

Interspinous Dynamic Stabilization

see Interspinous Dynamic Stabilization

1)
Tosic L, Baschera D, Oberle J, Alex A. Decompression and Dynamic Transpedicular Stabilization Using Polyetheretherketone Rods and Pedicle Screws vs. Decompression Alone for Single-Level Spinal Canal Stenosis with Listhesis: A Retrospective Case-Control Study. J Neurol Surg A Cent Eur Neurosurg. 2019 Aug 29. doi: 10.1055/s-0039-1688562. [Epub ahead of print] PubMed PMID: 31466108.
2)
Bonaldi G, Brembilla C, Cianfoni A. Minimally-invasive posterior lumbar stabilization for degenerative low back pain and sciatica. A review. Eur J Radiol. 2014 May 9. pii: S0720-048X(14)00212-5. doi: 10.1016/j.ejrad.2014.04.012. [Epub ahead of print] PubMed PMID: 24906245.

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