Nerve root retraction

Findings showed that posterior lumbar procedures, including retraction of paravertebral muscle, fenestration of the lamina, and retraction of the nerve root affect the posterior ramus. Excessive retraction of the nerve root has an especially disastrous effect on the posterior ramus. Such a violent maneuver within the spinal canal must be avoided [1)].

Feltes et al. studied whether the amount of retraction pressure applied to a compromised nerve root during lumbar discectomy has an impact on intra- or postoperative outcomes.

The authors conducted a prospective analysis of 20 patients. There were 12 men and 12 women whose mean age (+/- standard deviation [SD]) was 42.25 years +/- 15 years (range 21-65 years). During intraoperative electromyography (EMG) monitoring, measurements were obtained during routine retraction of the affected nerve root by using a specially designed and constructed nerve root retractor connected to a reconfigured personal computer for this specific purpose. Follow-up results were assessed in the immediate postoperative period and at up to 1 year. The maximum measured force applied during random periods of time was 9.85 N/second (mean 6.95 +/- N/second [+/- SD]). The mean retraction time was 39.5 +/- 21 (SD). No intraoperative EMG-detected irritation was noted during or after routine retraction. In four of 20 patients, sensory changes occurred at the ipsilateral nerve root level, which resolved at the time of discharge.

The authors found that routine nerve root retraction does not cause nerve root irritation, as demonstrated by EMG monitoring, nor was patient outcome affected in this series [2)].

The aim of a retrospective case study was to analyze the outcomes of minimal nerve root retraction in patients with an impending neurologic deficit in degenerative lumbar spine disease using full-endoscopic spine surgery.

Thirty-seven consecutive patients with impending neurologic deficit underwent endoscopic spine surgery through either the transforaminal or the interlaminar approach. Their clinical outcomes were evaluated with visual analog scale (VAS) leg pain score, Oswestry Disability Index (ODI), and MacNab scale score. The outcome of motor deficits were evaluated with the Medical Research Council Scale for Muscle Strength grade. Completeness of decompression was documented with a postoperative magnetic resonance imaging (MRI) and computed tomography (CT) scan.

A total of 40 lumbar levels of 37 patients were operated on, VAS score of the leg improved from 7.7 ± 1 to 1.9 ± 0.6 ($p < 0.0001$). ODI score improved from 74.7 ± 6.5 to 25.4 ± 3.49 ($p < 0.0001$). Motor weakness improved significantly immediately after surgery. The mean MRC grade increased to 1.97, 3.65, 4.41, and 4.76 preoperatively, at 1 week, at 3 months, and at the final follow-up, respectively, and all the patients with foot drop and cauda equina syndrome symptoms recovered completely. One patient with great toe drop recovered partially to MRC grade 3. The mean follow-up of the study was 13.3 ± 6.1 months. According to MacNab's criteria, 30 patients (80.1%) had good and 7 patients (18.9%) had excellent results. Three patients required revision surgery.

Minimal nerve root retraction during full-endoscopic spine surgery is safe and effective for the treatment of the impending neurologic deficit. They could achieve a thorough decompression of the

affected nerve root with acceptable clinical outcome and minimal postoperative morbidity [3].

1)
Nagayama R, Nakamura H, Yamano Y, Yamamoto T, Minato Y, Seki M, Konishi S. An experimental study of the effects of nerve root retraction on the posterior ramus. Spine (Phila Pa 1976). 2000 Feb 15;25(4):418-24. doi: 10.1097/00007632-200002150-00005. PMID: 10707385.
2)
Feltes C, Fountas K, Davydov R, Dimopoulos V, Robinson JS Jr. Effects of nerve root retraction in lumbar discectomy. Neurosurg Focus. 2002 Aug 15;13(2):E6. doi: 10.3171/foc.2002.13.2.7. PMID: 15916403.
3)
Kim HS, Raorane HD, Choi I, Wu PH, Yang KH, Yi YJ, Jang IT. Full-Endoscopic Lumbar Decompression with Minimal Nerve Root Retraction for Impending Neurologic Deficit in Degenerative Lumbar Spine Diseases. J Neurol Surg A Cent Eur Neurosurg. 2021 Jul 8. doi: 10.1055/s-0041-1725955. Epub ahead of print. PMID: 34237776.