Posterior full-endoscopic cervical foraminotomy

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Case series

Nineteen patients with osseous cervical foraminal stenosis who underwent posterior Endoscopic Cervical Foraminotomy using ultrasonic osteotome in our institution between April 2018 and April 2021 were enrolled in this study. All the patients were followed up more than 12 months. The patients' medical data, as well as pre- and postoperative radiologic findings were thoroughly investigated. The visual analogue score (VAS), Japan Orthopaedic Association (JOA) score, cervical dysfunction index (NDI), and modified MacNab criteria were used to assess the surgical efficacy.

Results: All the patients were successfully treated with PECF using ultrasonic osteotome. The pre- and postoperative VAS, NDI, and JOA scores were significantly improved. (P<0.05). According to the modified MacNab criteria, 17 patients were assessed as "excellent", 2 patient was assessed as "good" at the last follow up. There was no dura tear, nerve root damage, incision infection, neck deformity, or other complications.

Conclusion: Adequate nerve root decompression can be accomplished successfully with the help of ultrasonic osteotome in PECF, which has the advantage of reducing the probability of damage to the nerve root and dura mater, in addition to the original merits of endoscopic surgery ¹⁾.

From January 2016 through January 2022, PPCED involving a total of 663 segments was performed in 610 patients with radiculopathy who were diagnosed with cervical radiculopathy or mixed cervical spondylosis caused by foraminal stenosis or posterolateral disc herniation.

Results: PPCED was successfully completed in 610 patients, 6 of whom (0.98%) developed ULP. Two patients were diagnosed with double-segment cervical nerve root canal stenosis (C4/5/6, C5/6/7) and

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2 with migrated cervical disc soft herniation (a magnetic resonance image of one showed a migrated disc herniation downward from C4/5 in the sagittal plane; another showed this upward from C5/6); one patient was diagnosed with C5/6 intervertebral foraminal stenosis, and one had simple C4/5 lateral disc herniation. Postoperative ULP rates for C4/5 (2/30, 6.67%) and C5/6 (2/177, 1.13%) were much higher than those for the other levels. Anatomically, the width of the intervertebral foramen on computed tomography was 2.3 \pm 1.12 mm in ULP cases, which was significantly lower than that in non-ULP cases (3.4 \pm 1.83, P < 0.05). This suggests that preoperative foramen width correlates highly negatively with postoperative ULP incidence.

Limitations: This was a single-center, retrospective, nonrandomized study with a low level of evidence.

Conclusions: PPCED is a good treatment for cervical radiculopathy. The rate of postoperative ULP after PPCED is much lower than that after posterior cervical foraminotomy. Perturbation to the C5 (or C6) nerve root, thermal injury due to burr use or the radiofrequency applied, and marked foraminal stenosis are possible relevant factors associated with postoperative ULP².

compared the midterm clinical and radiological outcomes between 2 types of full endoscopic posterior cervical foraminotomy, including conventional posterior endoscopic cervical foraminotomy (PECF) and modified inclined technique for PECF.

Methods: One of the 2 types of PECF surgery was performed for defined cervical foraminal stenosis. The foraminal expansion ratio and facet resection rate and foraminal stenosis grade were measured using magnetic resonance imaging. Visual analogue scale (VAS) scores for neck and arm pain, neck disability index, MacNab criteria, operation time, hospital stay, and complications, including postoperative dysesthesia, were assessed. Clinical and radiological parameters were compared between the 2 surgical groups.

Results: There were 49 and 46 patients in the PECF and modified-PECF groups, respectively. The modified-PECF group showed significantly higher expansion of distal foraminal diameter and foraminal height, and a lower facet resection rate compared to PECF group (in all, p < 0.001). The modified-PECF group displayed significantly lower VAS score for neck pain at 1 day and 1 week after surgery and lower arm pain VAS score after 6-month follow-up (p = 0.002, p = 0.001, p = 0.002, respectively).

Conclusion: Compared with the PECF, the modified inclined technique has radiologic benefits, including enhanced facet joint preservation, restoration of the natural course of nerve roots, and prevention of restenosis by expanding the superior articular process base, especially in grade 2 foraminal stenosis. Furthermore, the modified inclined technique significantly improved the postoperative VAS score for neck pain within the 1-week follow-up and that of arm pain after 6-month follow-up ³⁾.

Posterior full-endoscopic cervical foraminotomy (PECF) is one of minimally invasive surgical techniques for cervical radiculopathy. Because of minimal disruption of posterior cervical structures, such as facet joint, cervical kinematics was minimally changed. However, a larger resection of facet joint is required for cervical foraminal stenosis (FS) than disc herniation (DH). The objective was to compare the cervical kinematics between patients with FS and DH after PECF.

Methods: Consecutive 52 patients (DH, 34 vs. FS, 18) who underwent PECF for single-level radiculopathy were retrospectively reviewed. Clinical parameters (neck disability index, neck pain and arm pain), and segmental, cervical and global radiological parameters were compared at postoperative 3, 6, and 12 months, and yearly thereafter. A linear mixed-effect model was used to assess interactions between groups and time. Any occurrence of significant pain during follow-up was recorded during a mean follow-up period of 45.5 months (range 24-113 months).

Results: Clinical parameters improved after PECF, with no significant differences between groups. Recurrent pain occurred in 6 patients and surgery (PECF, anterior discectomy and fusion) was performed in 2 patients. Pain-free survival rate was 91% for DH and 83% for FS, with no significant difference between the groups (P = 0.29). Radiological changes were not different between groups (P > 0.05). Segmental neutral and extension curvature became more lordotic. Cervical curvature became more lordotic on neutral and extension X-rays, and the range of cervical motion increased. The mismatch between T1-slope and cervical curvature decreased. Disc height did not change, but the index level showed degeneration at postoperative 2 years.

Conclusion: Clinical and radiological outcomes after PECF were not different between DH and FS patients and kinematics were significantly improved. These findings may be informative in a shared decision-making process.

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