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POSTERIOR CERVICAL ENDOSCOPIC LAMINECTOMY FOR CERVICAL SPONDYLOSIS WITH SPINAL CORD DISEASE

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Abstract:

Background: Cervical spondylotic myelopathy is one of the most common causes of spinal cord dysfunction. The treatment of cervical spondylotic myelopathy remains a clinical challenge. We aimed to investigate the reliability of posterior cervical endoscopic laminectomy for cervical spondylosis with spinal cord lesions.

Methods: We retrospectively analyzed 8 patients undergoing surgery. with posterior cervical endoscopic laminectomy. We used endoscopic assisted posterior laminectomy, a microscopic endoscope visualization system for the removal of disc herniation and intervertebral foramen decompression. The patients' follow-up functional outcomes were evaluated using the Japanese Orthopaedic Association (JOA) scoring system for cervical myelopathy and visual analog scale (VAS) for the assessment of axial neck pain.

Results: After time of the operation, the patient had a good mental state, and the activity of the limbs was more flexible than before, and the consciousness was more comfortable than before. The postoperative VAS scores were significantly increased and JOA scores were significantly decreased.

Conclusion: Posterior cervical endoscopic laminectomy is a feasible method for the treatment of cervical spondylotic myelopathy with spinal cord lesions. It has the advantages of small trauma, less bleeding, short postoperative hospital stay and quick recovery.

Introduction

Cervical spondylotic myelopathy is one of the most common causes of spinal cord dysfunction in the middle-aged and elderly population[1]. Surgery to relieve spinal nerve compression is one of the important treatments. Cervical anterior vertebral resection and fusion and cervical laminectomy are common surgical methods[2, 3]. Open surgery can achieve effective treatment, but they have more trauma and slower recovery. In recent years, minimally invasive techniques for cervical spine surgery have developed rapidly. Among them, endoscopic surgery has the advantage of reducing trauma and promoting post-operative recovery[4]. Posterior percutaneous total endoscopic cervical discectomy has been used for cervical disc herniation, the indication is disc herniation or nerve root canal stenosis, and cervical spondylotic myelopathy is considered to be a relative contraindication to this minimally invasive technique[5, 6].

The treatment of cervical spondylotic myelopathy remains a clinical challenge. Although some articles have reported cases of posterior cervical laminectomy for cervical spondylosis with spinal cord lesions by case report, the reliability of surgical methods still lacks large sample support[7-9]. Here, treatment data of 8 cases were retrospectively analyzed to highlight the modalities of treatment.

Methods

Patient Population

Between September 2017 and March 2019, a total of 8 patients were selected for surgical intervention in which the posterior cervical endoscopic laminectomy technique was used. There were 5 men and 3 women who ranged in age from 65 to 81 years (mean 76.6 years). Each patient presented with double upper limb numbness. Seven patients presented with lower limb numbness, and six walking has a "feeling on cotton". Appropriate reflex changes were noted in all patients but not predictably in those with only sensory changes. Each patient underwent thin-slice computerized tomography or MR imaging evaluation of the cervical spine. If the foraminal anatomy was not clearly visualized, as can occur when using MR imaging, a computerized tomography myelogram was obtained. MRI of five patients showed that the spinal cord was significantly thinner, and the T2 sequence showed a high spotted signal intensity of the at C4-5

(Figure 1A, B). CT scan of three patients showed cervical osteoarthritis, cervical instability, C2-7 disc herniation, and corresponding cervical spinal canal and intervertebral foramen stenosis (Figure 2A, 2B). Prior to being considered for surgical intervention, each

patient underwent a trial of conservative therapy, typically including narcotic agents, decreased activity, and oral steroid medication. Patients with progressive weakness were treated on an urgent basis.

Operative Technique

General local anesthesia, prone position, adjust the height of the prone position pad and the frontal silicone pad, so that the patient's neck is slightly flexed, the upper upper limbs are placed naturally on the hand guards on both sides of the operating bed, and the body fixing band is fixed to prevent falling. The patient reported no discomfort.

First, the K-wire was placed on the neck surface, and the C-arm X-ray was used to determine the level of the cervical 4 and marked. Disinfect, cover with sterile sheet, and apply a skin protective film. The heavier side was the surgical side, which was 1.5 cm incision on the side of the spinous process of the cervical vertebra 4. The 18G needle was infiltrated with anesthesia (0.75% lidocaine) to the bone surface of the left cervical lamina. The C-arm X-ray positive lateral fluoroscopy adjustment needle tip is located at the center of the cervical vertebra 4 surgical side lamina. The sharp knife cuts the skin about 0.8 cm horizontally, and a fine guide wire with a diameter of 0.8 mm is placed through the puncture needle. The soft tissue expander was placed step by step along the thin guide wire, and the soft tissue was expanded to 7 mm, and the endoscope working sleeve was placed. Once again through the C-arm X-ray positive lateral fluoroscopy, the working end of the cannula is located at the level of the cervical 4 lamina and the inner edge of the left coronal process of the cervical 4.

The endoscope enters the operation area through the working cannula, double-clicks the radiofrequency to stop bleeding under the endoscope, and the soft grasping forceps removes the soft tissue on the surface of the lamina, and clearly reveals the left lateral lamina of the cervical 4. Exposure range: upper boundary - lower edge of cervical 3 lamina; lower boundary - cervical 5 vertebral plate margin; medial border - cervical 4 spinous process outer edge; lateral boundary - cervical 4 joint process inner edge. Under the endoscope monitoring, a 2.5 mm diameter diamond grinding bit was used to remove the left side of the cervical 4 from the lower edge of the cervical 4 lamina. Abrasive range: medial border - cervical 4 spinous process outer edge; lateral border - cervical 4 joint process inner edge. After the left side of the cervical vertebra 4 was removed, the cervical 3/4, cervical 4/5 segmental ligamentum flavum was thickened and covered on the dorsal side of the dural sac. The laminectomy forceps carefully removed the cervical 3/4, the cervical 4/5 segmental ligamentum flavum to the cervical 5 vertebral plate margin, and the lower edge of the cervical 4 lamina, and fully exposed the dural sac. Pull out the working cannula, terminate the operation, the incision is not sutured, and the sterile accessory is directly wrapped. The patient's self-reported limb and body numbness was less than before surgery.

Results

The patients' follow-up functional outcomes were evaluated using the JOA scoring system for cervical myelopathy and VAS for the assessment of axial neck pain. We evaluated VAS scores at preoperative and at the time 0, 1st week, 3rd month, 6th month, 12th month and 18th month of postoperative and JOA scores at preoperative and at the time 1st week, 3rd month, 6th month, 12th month and 18th month of postoperative. After time of the operation, the patient had a good mental state, and the activity of the limbs was more flexible than before, and the consciousness was more comfortable than before. It is recommended that the patient wear a cervical collar to fix the cervical vertebra for 4 weeks. The effect of resection and cervical vertebrae were observed by CT scan (Figure 3A, 3B). Preoperative and postoperative VAS scores were evaluated for upper (Figure 4) and lower (Figure 5) limbs, respectively. Preoperative and postoperative JOA scores were also fully evaluated (Figure 6). The postoperative VAS scores were significantly increased and JOA scores were significantly decreased.

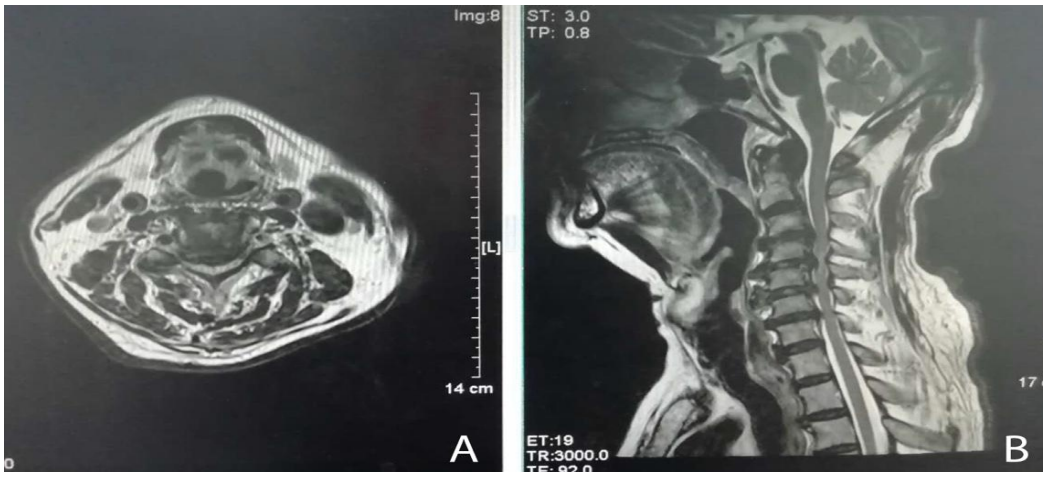

Figure 1: Preoperative cervical MRI. (A) Cross-section: The posterior margin of the C2 and 3 cones is slightly posterior, and the posterior longitudinal ligament is thickened and calcified. (B) sagittal plane: the cervical curvature and cone arrangement are poor, the posterior edge of the cone changes stepwise, and the 4/5 segment of the cervical vertebra is decompressed.

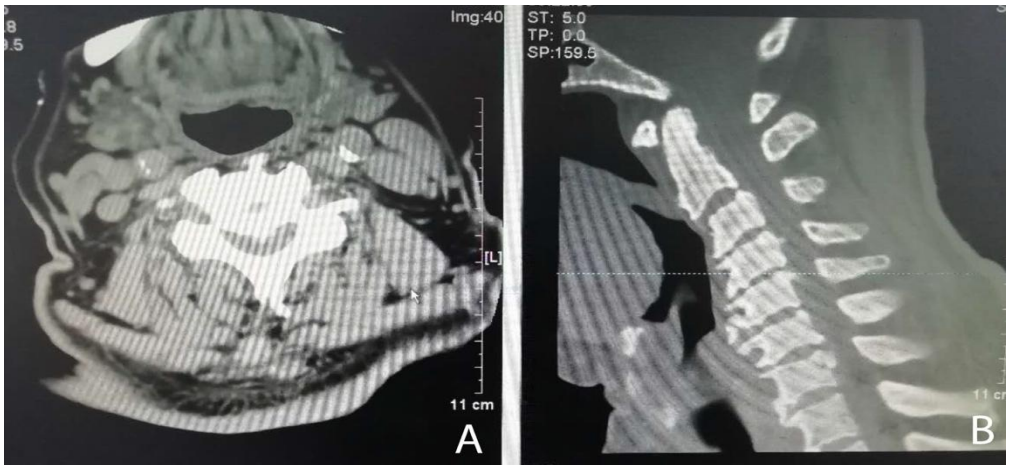

Figure 2: Preoperative cervical CT scan. (A) Cross-section: hypertrophy of the pyramidal edge and intervertebral facet joints. (B) Sagittal plane: Cervical curvature and poor alignment, C2-7 intervertebral disc protruding to the back.

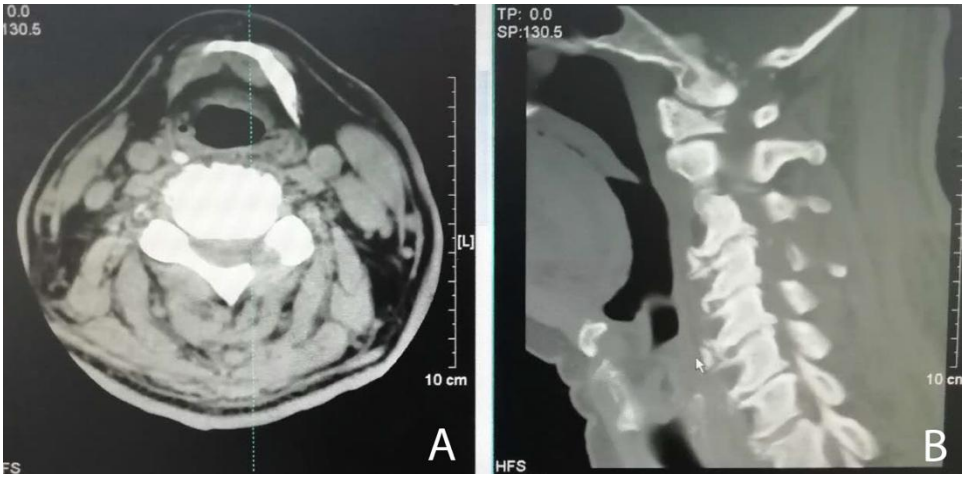

Figure 3: Postoperative cervical CT scan. (A) Cross-section: Left lateral laminectomy was performed in 4/5 segments, leaving the left facet joint intact. (B) Sagittal plane: the left lateral lamina of the neck 4 was completely removed, and the lower edge of the cervical 3 and the left margin of the cervical vertebra were removed.

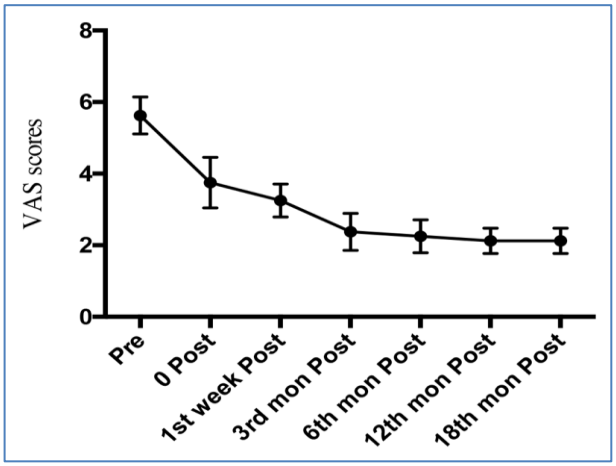

Figure 4: Preoperative and postoperative VAS scores were evaluated for upper limbs.

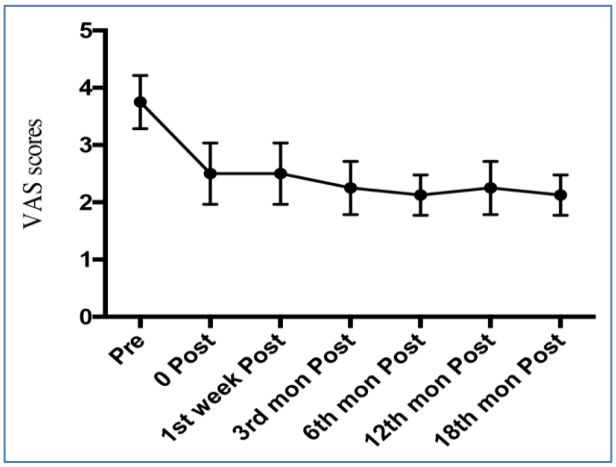

Figure 5: Preoperative and postoperative VAS scores were evaluated for lower limbs.

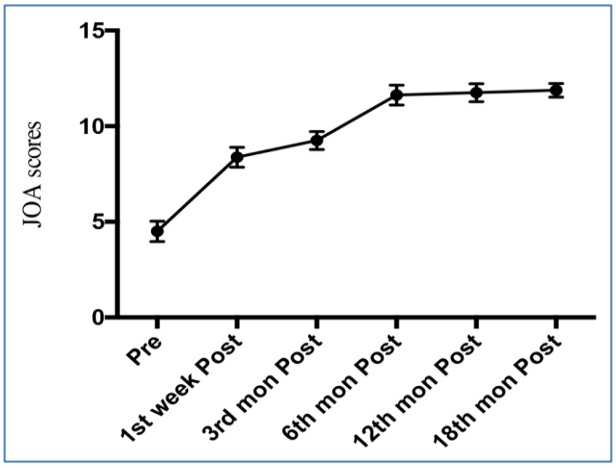

Figure 6: Preoperative and postoperative JOA scores were evaluated.

Discussion

For pressure from the dorsal root of the spinal cord, such as hypertrophic or calcified ligamentum flavum, posterior or posterolateral decompression is the most effective treatment. Classical open posterior cervical laminectomy may lead to cervical instability and deformity[10, 11]. Therefore, internal implants are often required to reconstruct cervical stability. However, reconstruction of the upper cervical spine will sacrifice some of the activity and rotation functions. In addition, fusion surgery has complications such as implant displacement, collapse, and even pseudo joint formation. In the case of open cervical semi-laminar resection or total laminectomy without injury to the cervical facet joints, the stability of the cervical vertebrae is less affected, and this procedure follows this principle[12]. In this study, the patient's cervical 4/5 segment of the spinal cord was decompressed significantly. We underwent the C4 semi-laminar plate under endoscopy and visualized the entire procedure to avoid excessive damage to the facet joint. No intraoperative or postoperative complications were encountered. The postoperative pain was significantly relieved and the quality of life improved significantly.

During traditional open upper cervical surgery, excessive blood loss often occurs due to localized blood vessels. Bleeding leads to unclear vision and therefore an increased risk of spinal cord injury. Sometimes it can even lead to changes or stops in surgery[13-17]. Endoscopes have been widely used in posterior decompression of the spine, which has the advantages of minimal trauma and less bleeding, providing a clearer view of the surgery. Optimal visualization of the target site is not compromised by bleeding, reducing the risk of spinal nerve damage[4, 18-20].

The traditional anesthesia of open laminectomy is reported in the literature as general anesthesia[21]. In this study, local infiltration anesthesia was used because the patient was a high-risk patient with general anesthesia, and the local anesthesia was well tolerated, avoiding the risk of general anesthesia. More importantly, the patient can reflect the self-feeling and the change of symptoms in real time under the condition of local infiltration anesthesia, which can effectively avoid the nerve damage caused by surgery. This is basically consistent with other disc reports related to intervertebral discs[22].

According to the literature, percutaneous endoscopic cervical discectomy usually uses a 5.9 or 6.9 mm endoscope[6, 23-25]. This working channel is mainly used for the treatment of cervical disc herniation with minimally invasive posterior locking technique. However, for cervical spinal stenosis caused by

ossification of the ligamentum flavum, more laminae need to be removed for central tube enlargement and spinal cord decompression. By using a 7mm working channel for the interlaminar channel, the endoscope is small enough to leave enough working space in the cervical canal[8]. As the spinal cord lesions may be further aggravated after thoracic decompression, cervical spinal cord stenosis may also cause unquestionable pressure damage to the spinal cord during decompression. In order to avoid interference with the spinal cord, we recommend using a high-speed drill bit to reveal the folds and thickening the ligamentum flavum and adequately remove it, which is the most important strategy for this procedure.

Although endoscopic laminectomy has the advantages of less trauma, less bleeding, shorter postoperative hospital stay, and faster recovery than conventional open surgery. However, the minimally invasive surgery can only complete the decompression of 1-2 segments, and the decompression effect is not sufficient. Moreover, when the operation is performed, the patient is in an awake state, and the patient's poor cooperation due to voluntary activities may increase the difficulty of surgery. These should still be the difficulties we should pay attention to and overcome.

Conclusion

Posterior cervical endoscopic laminectomy is a feasible method for the treatment of cervical spondylotic myelopathy with spinal cord lesions. It has the advantages of small trauma, less bleeding, short postoperative hospital stay and quick recovery. Although the scope of decompression is limited, the selective decompression of severely stressed segments is of great significance for alleviating symptoms and improving quality of life. It is still an effective and worthwhile treatment.

References

1. Davies BM, McHugh M, Elgheriani A, et al. The reporting of study and population characteristics in degenerative cervical myelopathy: A systematic review. PLoS One 2017;12:e0172564.
2. Liu X, Wang H, Zhou Z, Jin A. Anterior decompression and fusion versus posterior laminoplasty for multilevel cervical compressive myelopathy. Orthopedics 2014;37:e117-22.
3. Jalai CM, Worley N, Marascalchi BJ, et al. The Impact of Advanced Age on Peri-Operative Outcomes in the Surgical Treatment of Cervical Spondylotic Myelopathy: A Nationwide Study Between 2001 and 2010. Spine (Phila Pa 1976) 2016;41:E139-47.
4. Bucknall V, Gibson JA. Cervical endoscopic spinal surgery: A review of the current literature. J Orthop Surg (Hong Kong) 2018;26:2309499018758520.
5. Nadkarni SM, Kohli P, Patel B, Gore S, Kulkarni BS. STITCHLESS Percutaneous Endoscopic Cervical Discectomy: Are We Moving Towards Day Care Discectomy Procedure? Indian J Orthop 2017;51:653-57.
6. Won S, Kim CH, Chung CK, et al. Comparison of Cervical Sagittal Alignment and Kinematics after Posterior Full-endoscopic Cervical Foraminotomy and Discectomy According to Preoperative Cervical Alignment. Pain Physician 2017;20:77-87.
7. Deng ZL, Chu L, Chen L, Yang JS. Anterior transcorporeal approach of percutaneous endoscopic cervical discectomy for disc herniation at the C4-C5 levels: a technical note. Spine J 2016;16:659-66.
8. Lin Y, Rao S, Li Y, Zhao S, Chen B. Posterior percutaneous full-endoscopic cervical laminectomy and decompression for cervical stenosis with myelopathy: a technical note. World Neurosurg 2019; 19: 30051-8.
9. Nakamura Y, Yabuki S, Kikuchi S, Konno S. Minimally invasive surgery for osteoid osteoma of the cervical spine using microendoscopic discectomy system. Asian Spine J 2013;7:143-7.
10. Hashiguchi A, Kanchiku T, Nishida N, Taguchi T. Biomechanical Study of Cervical Posterior Decompression. Asian Spine J 2018;12:391-7.
11. Ma L, Liu FY, Huo LS, et al. Comparison of laminoplasty versus laminectomy and fusion in the treatment of multilevel cervical ossification of the posterior longitudinal ligament: A systematic review and meta-analysis. Medicine (Baltimore) 2018;97:e11542.
12. Zhou C, Zhang G, Panchal RR, et al. Unique Complications of Percutaneous Endoscopic Lumbar Discectomy and Percutaneous Endoscopic Interlaminar Discectomy. Pain Physician 2018;21:E105-12.
13. Heary RF, MacDowall A, Agarwal N. Cervical spondylotic myelopathy: A two decade experience. J Spinal Cord Med 2018:1-9.
14. Puvanesarajah V, Jain A, Cancienne JM, et al. Complication and Reoperation Rates Following Surgical Management of Cervical Spondylotic Myelopathy in Medicare Beneficiaries. Spine (Phila Pa 1976) 2017;42:1-7.
15. Wang T, Tian XM, Liu SK, Wang H, Zhang YZ, Ding WY. Prevalence of complications after surgery in treatment for cervical compressive myelopathy: A meta-analysis for last decade. Medicine (Baltimore) 2017;96:e6421.
16. Chung JY, Park JB, Seo HY, Kim SK. Adjacent Segment Pathology after Anterior Cervical Fusion. Asian Spine J 2016;10:582-92.

17. Uddanapalli SS. New Classification for Clinically Symptomatic Adjacent Segment Pathology in Cervical Disc Disease. Asian Spine J 2015;9:942-51.

18. Song Z, Zhang Z, Hao J, et al. Microsurgery or open cervical foraminotomy for cervical radiculopathy? A systematic review. Int Orthop 2016;40:1335-43.

19. Lee U, Kim CH, Chung CK, et al. The Recovery of Motor Strength after Posterior Percutaneous Endoscopic Cervical Foraminotomy and Discectomy. World Neurosurg 2018;115:e532-8.

20. Wang HJ, Tan G, Zhu LN, et al. The efficacy of repetitive transcranial magnetic stimulation for Parkinson disease patients with depression. Int J Neurosci 2018:1-24.

21. Li ZZ, Hou SX, Shang WL, Song KR, Zhao HL. The strategy and early clinical outcome of full-endoscopic L5/S1 discectomy through interlaminar approach. Clin Neurol Neurosurg 2015;133:40-5.

22. Pierce JT, Kositratna G, Attiah MA, et al. Efficiency of spinal anesthesia versus general anesthesia for lumbar spinal surgery: a retrospective analysis of 544 patients. Local Reg Anesth 2017;10:91-8.

23. Ruetten S, Komp M, Merk H, Godolias G. Full-endoscopic cervical posterior foraminotomy for the operation of lateral disc herniations using 5.9-mm endoscopes: a prospective, randomized, controlled study. Spine (Phila Pa 1976) 2008;33:940-8.

24. Zhang C, Wu J, Xu C, et al. Minimally Invasive Full-Endoscopic Posterior Cervical Foraminotomy Assisted by O-Arm-Based Navigation. Pain Physician 2018;21:E215-23.

25. Wan Q, Zhang D, Li S, et al. Posterior percutaneous full-endoscopic cervical discectomy under local anesthesia for cervical radiculopathy due to soft-disc herniation: a preliminary clinical study. J Neurosurg Spine 2018;29:351-7.