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Therapeutic Effectiveness of Endo-PCCD in the Lateral Decubitus Position under Local Anesthesia for Treating Cervical Spondylosis Myelopathy: An Observational Study

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Abstract

Objective: Cervical spondylitis myelopathy is a disease that can cause disability. Surgical management is an effective therapy for treating cervical spondylotic myelopathy. The current study aimed to determine the therapeutic effectiveness and safety of endoscopic posterior cervical canal decompression in the lateral decubitus position under local anesthesia for treating cervical spondylosis myelopathy.

Methods: In this study, we made the first attempt to perform endoscopic posterior cervical canal decompression in the lateral decubitus position under local anesthesia. Its effectiveness and safety were also observed. Fifty-eight patients were included. The therapeutic efficacy was evaluated by neck disability index, visual analog scale, modified Japanese orthopaedic association score, and total efficacy rate at pre-operation and post-operation 1, 3, and 6 months.

Results: All cases achieved good therapeutic effects. The visual analog scale and neck disability index were significantly declined and modified Japanese orthopaedic association score increased significantly at different follow-up time points compared with the pre-surgery. The total efficacy rate at post-operation 1, 3, and 6 months was 79%, 79%, and 90%, respectively. The average length of my stay was 1.6 days. No severe complications were observed.

Conclusion: The endoscopic posterior cervical canal decompression surgery in the lateral decubitus position under local anesthesia offers patients a more comfortable experience and safer medical model, further reducing surgical trauma length of inpatient hospital stay, in contrast to that in the prone position under general anesthesia with endotracheal intubation.

Keywords: Endoscopic posterior cervical canal decompression; Lateral decubitus position; Local anesthesia

Abbreviations: CSM: Cervical spondylotic myelopathy; CT: Cervical computed tomography; ECG: Electrocardiogram; Endo-PCCD: Endoscopic posterior cervical canal decompression; MJOA: Modified Japanese Orthopaedic Association Scores; MRI: Magnetic resonance imaging; NDI: Neck disability index; VAS: Visual analog scale

Introduction

Cervical spondylotic myelopathy (CSM) is a compressive spinal cord disease resulting from spondylosis or disc degeneration, in which upper limb paresthesias, sensory motor disorders, and gait disturbance are the primary symptoms [1]. Epidemiological investigations have now demonstrated that the prevalence of CSM among patients with cervical spondylosis is approximately 10% [2]. Nevertheless, CSM has the most devastating consequences among different types of cervical spondylosis including major neurological impairments and long-term disability [3]. What is more serious is that its initial diagnosis is often delayed [4]. Thus, recognizing early symptoms and administrating effective intervention are critical for the precise prognosis of CSM patients. To date, the most desired therapeutic option for CSM patients continues to be the surgical approach [5]. Depending on the specific pathology, operative interventions can be grouped into anterior, posterior, or combined approach [6]. Together with the advances in medical technology, however, several surgeons and interventional pain physicians have gradually realized that the traditional open

surgery can lead to large trauma, cause substantial bleeding, and rely on general anesthesia [7]. This adversely affects patients' early recovery, leading to prolonged hospitalization and an intangible increase in the financial burden on patients. Its counterpart is endoscopic spine surgery, which allows more complex procedures to be performed and has gradually become a preferred option for spinal diseases due to its small trauma and quick recovery [8]. Endoscopic posterior cervical canal decompression (endo-PCCD) is in common clinical use for treating CSM [9]. We have performed numerous endo-PCSD procedures in a prone position under local anesthesia in recent years. The therapeutic effect is remarkable. However, the patients in the prone position, covered with sterile towels, may have trouble breathing and fear, which are the main issues affecting the surgery. Therefore, we changed the surgical position from prone to lateral in 2021, which has since become the most preferred position for endo-PCCD surgery in our department. There are no previous investigations of endo-PCCD in the lateral decubitus position in the treatment of CSM thus far to the best of our knowledge. The present study will evaluate the safety and effectiveness of this surgical approach.

Material and Methods

Patient characteristics

We analyzed the medical data of 58 CSM patients, retrospectively, admitted to the Department of Pain Medicina, Peking University People's Hospital from March 2021 to May 2023. This evaluation was approved by the Ethics Committee of Peking University People's Hospital (approval No. 2023PHB). The present study did not involve direct contact with participants, which was only a secondary data analysis of pre-existing datasets; hence, informed consent was waived. All patients underwent biochemical routine, coagulation tests, blood routine, electrocardiographic (ECG) examination, cervical computed tomography (CT) and magnetic resonance imaging (MRI) before surgery. Targeted expansion examinations were performed if patients combined with other severe basic diseases (echocardiography will be carried out in patients with cardiovascular diseases).

The inclusion criteria were:

1) The diagnosis was confirmed with radiographic examination;

2) Single-cervical spinal stenosis;

3) Modified Japanese Orthopaedic Association Scores (mJOA) ≤ 14 points during enrollment;

4) Preoperative visual analog scale (VAS) pain scores ≥3 points;

5) Older than 18 years of age.

The exclusion criteria were:

1) Patients with major contraindications to surgery such as giant cervical disc herniation, significant kyphosis, or severe cervical segmental instability;

2) Patients unwilling to cooperate with the follow-up.

Endoscopic posterior cervical canal decompression

Patients were set in lateral decubitus position, the affected side up, with open intravenous access and routine vital signs monitored continuously. A marked line was made along the cervical vertebrae. The operative segment was identified with C-arm fluoroscopy assistance. The affected side of the space approximately 1cm away from the marked line was used as the puncture point. Local infiltration was performed layer by layer using 30 mL of 0.5% lidocaine with 1:100 000 adrenaline after routine disinfection and towel spreading. An 18-gauge, 100-mm long puncture needle was inserted adjacent to the junction of lamina and articular process. The 10 mL local anesthetics were injected again at this site to ensure sufficient anesthesia. Subsequently, a longitudinal skin incision of approximately 13 mm long was made at the puncture site. The skin, subcutaneous tissue, superficial and deep fascia, were incised in turn successively. And the paravertebral muscles and periosteum were bluntly separated using a blunt guide rod with a diameter of 6.3 mm. A threaded working cannula of the cervical endoscope with an external diameter of 13mm and internal diameter of 10.1mm was inserted through the incision onto the bone surface. Then, the cryogenic plasma knife (DZX-G3040-A340, Shaanxi, China) was performed to reveal the convergence of inferior edge of the vertebral plate superior and the superior edge of the vertebral plate inferior, that was the so-called V-point, and the ligamentum flavum between the two laminae. Afterwards, the lower trailing margin of the upper lamina, the margin edge of the lower lamina, and the medial facet joints were progressively bitten off using a lamina rongeur, until fully exposing the cranial, caudal and lateral attachment points of the ligamentum flavum. Under endoscopic guidance, we should exercise the ligamentum flavum to adequately expose the dural sac from the ipsilateral to the contralateral side. Throughout the endoscopic surgical procedure, it is noteworthy that a continuous flow of physiological saline with a range of pressure should be maintained through the endoscope to ensure a sufficient gap between the ligamentum flavum and the dural sac, preventing neurological damage from the surgical manipulation. At this point, the ipsilateral decompression was completed. As for contralateral decompression, if needed, the specific operation steps were like that described above. Ultimately, both the ipsilateral and contralateral dural sacs were adequately exposed to achieve optimal decompression for patients (Figure 1). Baseline clinical data were collected including sex, age, affected side, disease course, history of underlying diseases, length of stay, operative time, surgical levels, neck disability index (NDI), mJOA, and VAS on the day of admission. Follow-up examinations were conducted by a well-trained research assistant for 1 months, 3 months, and 6 months. The treatment effectiveness was assessed based on the parameters described below.

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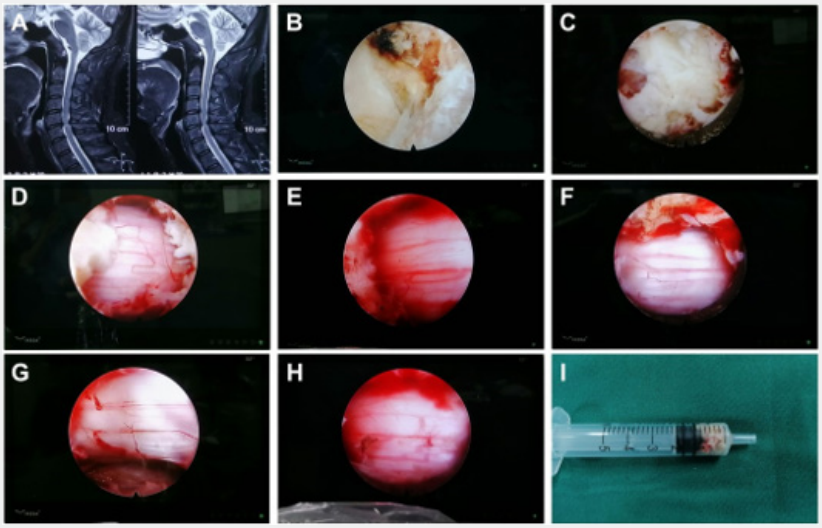

Figure 1: The surgical procedure.
Note A: the magnetic resonance images (MRI) of the patient. Preoperative MRI showing the spinal cord compression from C5-6. B: the V-point. C: the ligamentum flavum is fully exposed. D: the ligamentum flavum is incised. E: the cranial attachment points of the ligamentum flavum. F: the caudal attachment points of the ligamentum flavum. G: the lateral attachment points of the ligamentum flavum. H: dural sac is fully exposed from the ipsilateral to the contralateral side. I: the bone and ligamentum flavum samples removed during surgery.

NDI: NDI is a widely used self-rate instrument for assessing the limitations in daily activities that may result from cervical pain, which aids in treatment planning and monitoring progress over time [10]. It contains ten items; each item represents different aspects of daily activities.

mJOA: The mJOA scores are a set of clinical scales used to evaluate neurological deficits in patients suffering from CSM [11]. It is derived from the original JOA score, with modifications that improve its reliability and sensitivity.

VAS: The VAS is also a self-assessment tool for measuring pain intensity, with a range from painless to intolerable severe pain (0 to 10 points). Total efficacy rate: Curative effect assessment was dichotomized into two categories: effective treatment and ineffective treatment. VAS<3 points, NDI<20 points, and mJOA>14 points after surgery are considered markedly effective; the converse is ineffective. The therapeutic efficiency rate (%) =effective/n×100.

Statistical Analysis

All data handling and statistics were completed by an independent researcher using SPSS 25.0 software (IBM Corporation, Armonk, NY, USA). The Shapiro-Wilk test was carried out to determine whether quantitative data obeyed normal (Gaussian) distributions. In the present study, except for age, all numerical variables such as disease course, length of stay, operative time, NDI, mJOA, and VAS were conformed to non-normal distribution. Thus, age is presented as means and standard deviations (SD), and other quantitative data mentioned above are presented as median and interquartile range. Friedman test is performed to compare the NDI, mJOA, and VAS at different follow-up time points while a Mann-Whitney U test was used for post hoc pairwise contrasts. P-values < 0.05 was considered statistical significance.

Results

Participant demographic and clinical characteristics

In total, we enrolled 58 participants suffering from CSM for this evaluation. Of the subjects, there were 34 female patients and 24 male patients. The mean age was 55.40 years (SD=10.244). The detailed clinical characteristics are summarized in Table 1. As innovation is pouring and modern medicine is developing, endoscopic technology is gaining increasing popularity in the treatment of CSM [12]. Nevertheless, general anesthesia remains the first-choice anesthetic modality for most endoscopic procedures, especially for cervical surgery [13]. Most endoscopic posterior cervical spine surgeries require participants to be in the prone position, with many aseptic towels covering the head [14]. All these factors not only increase the difficulty of airway management but also hinder circulatory stability for anesthesiologists. Moreover, some patients may experience nausea and vomiting after receiving general anesthesia [15]. This is also a critical challenge for post-operative management. A clinical study by Zhao et al. [16] showed that the hospitalization duration was approximately five days for CSM patients who underwent posterior percutaneous endoscopic unilateral laminotomy under general anesthesia, even though the results were quite ideal [16]. In contrast, the mean length of hospital stay in that study was longer than in our study (1.6 days). The difference, of course, might be related to the different discharge standards in different studies. In this research, only patients without a wound hematoma in the previous 12 hours were allowed to leave the hospital. Anyway, this could indirectly reflect the advantage of local anesthesia.

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Table 1: Participant demographic and clinical characteristics.

Endo-PCCD	
Age	55.40±10.244
Sex	
Male	24
Female	34
Disease course (mon)	13.50 (2-45)
Length of inpatient hospital stay (d)	2 (1-5)
Operation time (min)	64 (45-80)
Affected side	
Left	27
Right	31
Operated segmental	
C3-4	20
C4-5	16
C5-6	12
C6-7	10
Pre-treatment VAS	6 (3-8)
Pre-treatment NDI	40 (30-55.56)
Pre-treatment mJOA	10 (7-16)
History of underlying disease	
Hypertension	31
Type 2 diabetes	23

Abbreviations: NDI, neck disability index; mJOA, Modified Japanese Orthopaedic Association Scores; VAS, visual analog scale.

The changes of VAS, NDI, and mJOA for all time points

Compared with pre-surgery, there was significant decline for VAS after treatment at different follow-up time points (P1mon=0.00, P3mon=0.00, P6mon=0.00). While no statistical difference was observed between post-operative 1 month, 3months, and 6 months (Figure 2A). Also, similar results were obtained for functional assessments. As shown in Figure 2B, The NDI decreased significantly at each time point compared to pre-surgery. (P1mon=0.000, P3mon=0.000, P6mon=0.000). Additionally, the NDI at 3 months and 6 months was significantly reduced compared to that at 1 month. The mJOA also improved following surgery considering our analysis (Figure 2C). We found that the mJOA increased significantly when compared with baseline (P1mon=0.006, P3mon=0.000, P6mon=0.000).

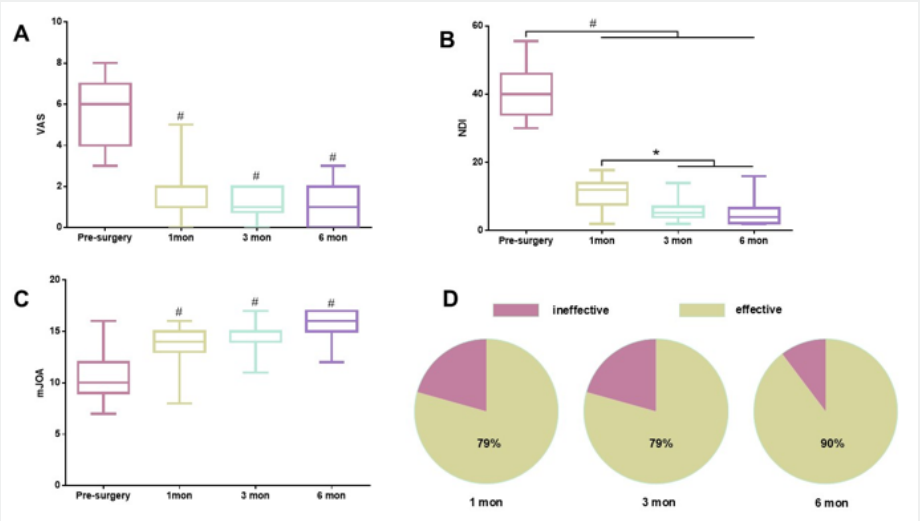

Figure 2: The Alterations of VAS, NDI, mJOA, and the total efficacy rate at each time point.
Note: The changes of VAS(A), NDI(B), mJOA(C), and the total efficacy rate(D) for all time points. Results are presented as median with range. #P < 0.05, vs. pre-surgery, * P<0.05, vs. 1 month after surgery.
Abbreviations: VAS: visual analog scale; NDI: visual analog scale; mJOA: Modified Japanese Orthopaedic Association Scores.

Total efficacy rate

In the present study, we opted to use VAS < 3 points, NDI<20 points, and mJOA>14 points as the standard for an effective therapy. The total efficacy rate of the endo-PCCD were 79%, 79%, and 90% at post-treatment 1month, 3months, and 6 months, respectively (Figure 2D). The present study also found that the therapeutic efficacy of endo-PCCD in the lateral decubitus position under local anesthesia was satisfactory for CSM patients. The fly in the ointment was that there were still about 10% of the patients with CSM having poor prognosis. We assumed that preoperative axonal degeneration and positive pathological signs such as Hoffmann sign might be associated with the unsatisfactory therapeutic effects after the overall analysis [17]. In addition, one patient had suboptimal treatment due to the concomitant presence of OPLL. And we planned for an endoscopic anterior cervical canal surgery in this patient

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Discussion

In the present study, all the 58 patients with CSM underwent endo-PCCD in lateral position under local anesthesia. Typically, if patients suffering from cervical spinal cord compression induced by various factors are given sufficient decompression, their status improves within days. Therefore, how to reduce intraoperative trauma, improve surgical safety and comfort, and decrease the total duration of hospitalization for patients is a key issue to consider. Another strength of endo-PCCD under local anesthesia is that real-time feedback can be gained from patients during surgery. After all, communication with patients is sometimes better than electrophysiological monitoring modalities. And the patients could not experience additional distress, as a continuous flow of physiological saline was maintained through the endoscope to ensure a sufficient gap between the ligamentum flavum and the dural sac, thereby preventing neurological damage from surgical manipulation. As for the saline flow pressure, the best condition is to ensure a clear surgical field while also maintaining adequate neurovascular supply. This was confirmed in previous research [8]. Zhang, et al. [8] found that endoscopic posterior cervical decompression surgery for treating ossification of the posterior longitudinal ligament (OPLL), one of the causes of CSM, showed an excellent safety profile. However, all patients in that study were operated on in the prone position, which caused difficulty in breathing and anxiety for many patients. Based on our clinical observations, patients in the lateral decubitus position had higher levels of comfort than those in the prone position during the operation. Although there was a lack of direct objective comparisons regarding intraoperative comfort between the two types of surgical positions experiencing additional distress. What's more, surgery in the lateral position did not affect the full exposure of the surgical field. Adequate hemostasis was performed during the operation without drainage strip placement, along with the wound compression on the night of the surgery. For this reason, we did not observe serious complications such as epidural hematoma. Overall, the safety of the endo-PCCD in the lateral decubitus position under local anesthesia was guaranteed. It is undeniable that there are still deficiencies in this study. Firstly, it is a single-center retrospective observational analysis with relatively small sample size; thus, future multicenter studies with large-sample are still needed to verify the conclusion. Secondly, the surgical approach in this study may have unfavorable results for those CSM patients with comorbid the ventral spinal cord compression. OPLL is a case in point. Thirdly, the duration of follow-up is also a deficiency to our study. Fourthly, no follow-up data on whether patients have undergone oral analgesics after surgery are not available. This appeared to be a crucial factor for the prognosis. Finally, we have not contrasted the patient's experience and satisfaction during surgery in the prone position vs. in the lateral position as an objective indicator. However, the prone position is preferred for patients' subjective experience based on our clinical observation.

Conclusion

This article provides new options for better treatment of CSM. The endo-PCCD surgery in the lateral decubitus position under local anesthesia offers patients a more comfortable experience and safer medical model, further reducing surgical trauma length of inpatient hospital stay, in contrast to that in the prone position under general anesthesia with endotracheal intubation.

References

1. Opara J, Odzimek M (2024) Cervical Spondylotic Myelopathy-Diagnostics and Clinimetrics. Diagnostics (Basel) 14(5): 556.
2. McCormick JR, Sama AJ, Schiller NC, Butler AJ, Donnally CJ, 3rd. (2020) Cervical Spondylotic Myelopathy: A Guide to Diagnosis and Management. J Am Board Fam Med 33(2): 303-313.
3. Williams J, D'Amore P, Redlich N, Darlow M, Suwak P, et al. (2022) Degenerative Cervical Myelopathy: Evaluation and Management. Orthop Clin North Am 53(4): 509-521.
4. Zhong W, Wang L, Huang T, Luo X (2021) Risk factors for rapid progressive neurological deterioration in patients with cervical spondylotic myelopathy. J Orthop Surg Res 16(1): 75.
5. Wathen CA, Jacob AT, Bohorquez D, Mannikarottu C, et al. (2024) Treatment strategies for cervical spondylotic myelopathy-is laminectomy alone a safe and effective option? J Spine Surg 10(3): 344-353.
6. Ghogawala Z, Terrin N, Dunbar MR, Breeze JL, Freund KM, et al. (2021) Effect of Ventral vs Dorsal Spinal Surgery on Patient-Reported Physical Functioning in Patients With Cervical Spondylotic Myelopathy: A Randomized Clinical Trial. Jama 325(10): 942-951.
7. Liu J, Zhu B, Chen L, Jing J, Tian D (2022) Clinical effects of unilateral biportal endoscopic decompression for lumbar posterior apophyseal ring separation. Front Surg 9: 948417.
8. Xifeng Z, Zhang J, Yan Y, Bu R, Fan H, et al. (2023) Endoscopic Posterior Cervical Decompression for Ossified Posterior Longitudinal Ligament: A Technical Note. Int J Spine Surg 17(3): 356-363.
9. Lin Y, Rao S, Li Y, Zhao S, Chen B (2019) Posterior Percutaneous Full-Endoscopic Cervical Laminectomy and Decompression for Cervical Stenosis with Myelopathy: A Technical Note. World Neurosurg 124: 350-357.
10. Vernon H (2008) The Neck Disability Index: state-of-the-art, 1991-2008. J Manipulative Physiol Ther 31(7): 491-502.
11. Squires M, Schultz L, Schwalb J, Park P, Chang V, et al. (2023) Correlation of mJOA, PROMIS physical function, and patient satisfaction in patients with cervical myelopathy: an analysis of the Michigan Spine Surgery Improvement Collaborative (MSSIC) database. Spine J 23(4): 550-557.
12. Gatam AR, Gatam L, Phedy, Mahadhipta H, Luthfi O, et al. (2022) Full Endoscopic Posterior Cervical Foraminotomy in Management of Foraminal Disc Herniation and Foraminal Stenosis. Orthop Res Rev 14: 1-7.
13. Wang H, Ma L, Yang D, Wang T, Wang Q, et al. (2017) Cervical plexus anesthesia versus general anesthesia for anterior cervical discectomy and fusion surgery: A randomized clinical trial. Medicine (Baltimore) 96(7): e6119.
14. Wang D, Xu J, Zhu C, Zhang W, Pan H (2023) Comparison of Outcomes between Unilateral Biportal Endoscopic and Percutaneous Posterior Endoscopic Cervical Keyhole Surgeries. Medicina (Kaunas) 59(3): 437.
15. Kim SY, Sim KM, Na HS, Koo BW, Shin HJ (2024) Effect of remimazolam

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for general anesthesia on postoperative nausea and vomiting: A systematic review and meta-analysis. Anaesthesiologie 73(10): 685-693.

16. Zhao XB, Ma YJ, Ma HJ, Zhang XY, Zhou HG (2022) Clinical Efficacy of Posterior Percutaneous Endoscopic Unilateral Laminotomy with Bilateral Decompression for Symptomatic Cervical Spondylotic Myelopathy. Orthop Surg 14(5): 876-884.

17. Karadimas SK, Gatzounis G, Fehlings MG (2015) Pathobiology of cervical spondylotic myelopathy. Eur Spine J 24(Suppl 2): 132-138.

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