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# Clinical Observation on the Effectiveness of Combined Anterior and Posterior Cervical Surgery for Cervical Spinal Stenosis with Cervical Injury

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**Abstract:** *Objective:* To explore and analyze the clinical effectiveness of combined anterior and posterior cervical surgery for the treatment of cervical spinal stenosis with cervical injury. *Methods:* From March 2023 to June 2024, 40 patients who received treatment for cervical spinal stenosis with cervical injury in our hospital were selected as the study subjects. They were randomly divided into the experimental group and the control group, with 20 patients in each group. The experimental group underwent combined anterior and posterior cervical surgery, while the control group underwent simple anterior cervical decompression surgery. The changes in clinical indicators and improvement in cervical function before and after surgery were compared and analyzed between the two groups. *Results:* Following surgical treatment, the clinical indicators in the experimental group improved more significantly than those in the control group. Additionally, the postoperative cervical function improvement in the experimental group was superior to that in the control group. The differences between the two groups were statistically significant ($P < 0.05$). *Conclusion:* For patients with cervical spinal stenosis and cervical injury, the combined anterior and posterior cervical surgery approach can effectively improve cervical function, demonstrating significant therapeutic effects. This surgical method is worthy of clinical promotion.

**Keywords:** Combined anterior and posterior cervical surgery; Cervical spinal stenosis; Cervical injury; Clinical effectiveness

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## 1. Introduction

There are multiple causes of cervical spinal stenosis, including cervical injury and acquired physiological degeneration of the cervical spine. Among these, cervical injury is a primary factor leading to cervical spinal stenosis. For patients with cervical spinal stenosis and cervical injury, the treatment process primarily focuses on local spinal canal decompression while selecting an appropriate surgical approach based on the patient's physical condition, such as anterior cervical surgery or posterior cervical surgery [1]. If a combined anterior and posterior

cervical surgery approach is used during treatment, it can not only improve cervical function but also alleviate the impact of the disease, helping patients recover their health and return to normal life more quickly. This study selected 40 patients who underwent combined anterior and posterior cervical surgery at our hospital as the research subjects to further investigate and analyze the clinical effectiveness of this surgical approach for cervical spinal stenosis with cervical injury. The specific findings are reported as follows.

## 2. Clinical information and methods

### 2.1. Clinical information

A total of 40 cases were selected as research subjects. Through random grouping, the 40 patients were divided into two groups: the experimental group and the control group, with 20 patients in each group. In the experimental group, there were 11 male and 9 female patients, aged between 37 and 66 years, with an average age of 54.21 ± 3.15 years. They underwent combined anterior and posterior cervical spine surgery. In the control group, there were 12 male and 8 female patients, aged between 37 and 66 years, with an average age of 54.31 ± 3.24 years. They underwent anterior cervical decompression surgery alone. There were no significant differences in general clinical characteristics between the two groups ($P > 0.05$), making them comparable.

Inclusion criteria: (1) All patients in this study exhibited clinical manifestations of cervical spinal canal stenosis with cervical spine injury, such as numbness and weakness in both upper limbs and unsteady gait. Based on cervical imaging results after hospital admission, patients with an IOA score of less than 13 were diagnosed with cervical spinal canal stenosis and cervical spine injury. All patients underwent surgery and signed informed consent forms before the procedure. (2) Patients had complete medical records. (3) Patients were conscious and had basic communication abilities.

Exclusion criteria: (1) Patients with osteoporosis or other systemic bone diseases were excluded. (2) Patients with systemic dermatological diseases were excluded. (3) Patients with systemic vascular diseases were excluded. (4) Patients with mental illnesses were excluded. (5) Patients who did not understand the content of this study were excluded [2].

### 2.2. Methods

The control group underwent anterior cervical decompression surgery alone. These patients were placed in a prone position and administered general anesthesia. Once anesthesia was effective, an incision was made on the right anterior side of the neck. Through this incision, the anterior part of the cervical vertebrae was exposed. Under C-arm X-ray guidance, the site of cervical spinal stenosis and cervical spine injury was identified. The anterior ligaments at the stenotic and injured sites were incised, and a curette was used to remove the cartilage endplate, nucleus pulposus, and surrounding osteophytes. The patient's head was then positioned to facilitate the implantation of an autologous bone graft at the affected site, which was fixed using a peptide plate.

The experimental group underwent combined anterior and posterior cervical spine surgery. These patients were placed in a supine position and administered general anesthesia. Once anesthesia was effective, an oblique incision was made on the anterior side of the neck, extending from the sternocleidomastoid muscle to the anterior vertebral body. After dissecting the prevertebral fascia, the lesion site identified under C-arm X-ray was exposed. The intervertebral disc and cartilage at the lesion site were removed, and necrotic tissue in the ligament and affected cervical vertebrae was cleared using a rongeur and curette. An autologous iliac bone graft was then

implanted. The patient was then repositioned into a prone position with the assistance of nursing staff. A horizontal incision was made at the midline of the cervical spine to enlarge the posterior approach, exposing the lamina and spinous processes. A micro-drill was used to split the spinous process in half, and after opening the enlarged spinal canal, artificial bone grafting and double-door laminoplasty were performed. Finally, the incision was sutured [3].

## 2.3. Observation indicators

The observation and comparison of changes in various surgical treatment indicators and the improvement of cervical spine function before and after treatment in the two patient groups.

(1) Comparison of clinical observation indicators for surgical treatment in both groups: A statistical comparison was conducted on surgical treatment time, intraoperative blood loss, postoperative spinal cord function scores, and hospital stay duration in both groups. The postoperative spinal cord function was evaluated using the European Myelopathy Score (EMS), with a total score of 20 points. A higher score indicates less spinal cord dysfunction, while a lower score indicates more severe dysfunction.

(2) Observation indicators for cervical spine function improvement before and after treatment in both groups: This study used the Japanese Orthopedic Association (JOA) Cervical Function Score to assess the improvement in cervical spine function before and after surgical treatment in both groups. The total score is 17 points, where a higher score indicates better improvement in cervical spine function, and a lower score indicates poorer improvement.

## 2.4. Data processing

SPSS20.0 software was used for data processing. Measurement data were expressed as mean ± standard deviation (SD) and analyzed using the *t*-test. Count data were expressed as frequencies and percentages and analyzed using the chi-square test. Statistical significance was set at $P < 0.05$.

# 3. Results

## 3.1. Comparison of clinical observation indicators for surgical treatment in both groups

A comparison of the clinical observations for surgical treatment in both groups is shown in **Table 1**. According to **Table 1**, the experimental group, which underwent a combined anterior-posterior cervical surgery approach, had shorter surgical treatment times and hospital stays than the control group, which underwent a single anterior cervical decompression surgery. Additionally, the experimental group had less intraoperative blood loss and higher spinal cord function scores. The differences between the two groups were statistically significant ($P < 0.05$). The comparison of clinical observations for surgical treatment in both groups is shown in **Table 1**.

**Table 1.** Comparison of clinical observation indicators for surgical treatment in both groups

| Group | *n* | Operation time (min) | Intraoperative blood loss (mL) | Hospital stay (days) | Lysholm score |
|---|---|---|---|---|---|
| Experimental group | 20 | 63.14 ± 10.78 | 80.02 ± 11.24 | 7.56 ± 2.18 | 15.68 ± 2.21 |
| Control group | 20 | 86.45 ± 12.17 | 135.42 ± 12.47 | 13.46 ± 2.97 | 7.64 ± 2.07 |
| *t* | | 6.412 | 14.757 | 7.161 | 11.874 |
| *P* | | 0.000 | 0.000 | 0.000 | 0.000 |

### 3.2. Comparison of cervical spine function improvement before and after treatment in both groups

The comparison of cervical spine function improvement before and after treatment in the two groups is shown in **Table 2**. As seen in **Table 2**, the experimental group, which underwent combined anterior and posterior cervical spine surgery, and the control group, which received only anterior cervical decompression surgery, were compared for cervical spine function improvement before and after treatment. Before treatment, there was no significant difference in JOA scores between the two groups ($P > 0.05$). After treatment, the JOA scores of the experimental group were better than those of the control group, and the difference was statistically significant ($P < 0.05$).

**Table 2.** Comparison of cervical spine function improvement before and after treatment in both groups

| Group | *n* | JOA score results | |
|---|---|---|---|
| | | Before treatment | After treatment |
| Experimental group | 20 | 5.42 ± 1.34 | 14.85 ± 2.17 |
| Control group | 20 | 5.74 ± 1.21 | 7.63 ± 2.31 |
| *t* | | 0.792 | 10.187 |
| *P* | | 0.432 | 0.000 |

## 4. Discussion and conclusion

In the clinical field, one of the more common spinal surgical conditions is cervical spinal stenosis with cervical spine injury. This condition primarily affects middle-aged and elderly individuals. Once the disease occurs, patients not only experience significant physical pain but also suffer from disruptions in their daily lives. Surgical treatment is the primary approach for cervical spinal stenosis with cervical spine injury. However, due to variations in patients' physical conditions, the surgical methods used differ, leading to varying treatment outcomes [4]. Finding a reasonable and effective treatment method to improve cervical spine function in patients with cervical spinal stenosis and injury and ensuring optimal treatment outcomes are key concerns in the clinical field today.

It is well known that the cervical spine is a critical structural component of the human body and is highly susceptible to injury. It is closely connected to the brain and spinal cord, serving as a crucial pathway for transmitting various signals throughout the body and facilitating the transport of nutrients to the brain. Given this, any pathological changes in the cervical spine can directly impact signal transmission and brain nutrition, making cervical spine diseases a significant focus in the clinical field. Cervical spinal stenosis is generally classified into two types: primary spinal stenosis, which is relatively rare in clinical practice, and secondary spinal stenosis, which is more common, such as degenerative osteoarthritis of the spine. In patients with cervical spinal stenosis, early clinical manifestations include significant pain, numbness, and weakness in the upper limbs, typically beginning with arm discomfort characterized by soreness and numbness. As the disease progresses, symptoms may extend to the lower limbs, affecting one side of the body with noticeable clinical signs such as shoulder pain and fingertip numbness, or affecting all four limbs simultaneously. In the mid-to-late stages of disease progression, patients may experience severe motor impairments, specifically presenting with pyramidal tract symptoms, including unsteady gait, a sensation of a heavy head and light feet while walking, and weakness in the legs, making walking difficult. In severe cases, patients may develop quadriplegia and become completely immobile [5]. In the final stages of the

disease, patients may exhibit clinical symptoms such as urinary incontinence and urinary retention. Patients with spinal stenosis have a higher likelihood of developing cervical spine-related conditions, and the cervical spine is particularly prone to injury, which can lead to neurological disorders. Even minor injuries can result in severe neurological issues. This risk is especially pronounced in older patients, who may suffer nerve damage if they make sudden or excessive movements.

With the advancement of the times, continuous improvements in medical technology, and the emergence of various modern medical devices, favorable conditions have been provided for the treatment of cervical spinal canal stenosis with cervical spine injury, promoting higher examination and diagnosis rates. As a relatively common spinal disease in clinical practice, cervical spinal canal stenosis with cervical spine injury is primarily treated through surgical intervention. However, the treatment effects and prognosis vary depending on the surgical approach. The reason for this variation lies in the necessity of assessing the patient's physical condition and determining the most suitable surgical plan based on actual circumstances.

In recent years, surgical treatment plans for cervical spinal canal stenosis with cervical spine injury have been continuously optimized, significantly improving safety. However, due to the complex structure of the cervical spine and the relatively high surgical risks, selecting an appropriate surgical approach is crucial. In treating patients with cervical spinal canal stenosis with cervical spine injury, CT and MRI results can be used to determine the most suitable surgical approach. During the procedure, the exact location of the cervical spine damage should be identified, and decompression should be performed precisely at the site of compression. The focus of treatment is to directly address the compressive factors and enhance cervical spine stability through bone grafting. Based on different surgical approaches, procedures can generally be classified into anterior and posterior approaches, with different surgical methods corresponding to varying degrees of cervical spine injury. The choice of approach should be based on the patient's specific condition.

In this study, the experimental group, which underwent a combined anterior-posterior cervical surgery approach, showed more significant improvement in cervical spine function and had higher JOA scores compared to the control group, which underwent only anterior cervical decompression surgery. Additionally, the experimental group exhibited better outcomes in terms of surgical duration, intraoperative blood loss, and postoperative hospital stay, with significant differences between the two groups ($P < 0.05$). The use of the combined anterior-posterior cervical surgery approach helps minimize potential weaknesses in traditional surgical treatments, effectively reducing anterior and posterior cervical pressure and facilitating cervical spine function recovery. In contrast, a single anterior cervical decompression surgery may compromise the stability of cervical spine segments. In specific treatments, the combined anterior-posterior approach improves the patient's cervical spine condition, thereby enhancing the stability of the anterior column structure of the cervical spine [6]. Moreover, patients undergoing the combined anterior-posterior cervical surgery approach experience a reduction in surgical frequency and the number of procedures required, preventing repeated surgeries that could lead to further cervical spine damage. This approach also shortens treatment duration, ensuring effective treatment while alleviating the financial burden on patients and reducing medical costs.

According to the study results, the clinical indicators in the experimental group showed greater improvements than in the control group, and postoperative cervical spine function recovery was also superior in the experimental group. The differences between the two groups were statistically significant ($P < 0.05$). Therefore, the application of the combined anterior-posterior cervical surgery approach in the clinical treatment of cervical spinal canal stenosis with cervical spine injury not only enhances cervical spine function but also controls intraoperative blood

loss, continuously improves cervical spine function scores, ensures postoperative recovery, shortens hospital stays, and facilitates a quicker return to normal life. This approach demonstrates significant therapeutic value and effectiveness, making it worthy of promotion in clinical practice.

## Disclosure statement

The authors declare no conflict of interest.

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