



Case report

Clinical effect of combined anterior and posterior approach surgery for cervical spondylotic myelopathy

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Abstract: Objective: To evaluate the clinical efficacy of combined anterior and posterior approach surgery for patients with spinal type. **Methods:** 96 patients with cervical spondylosis were randomly selected among all patients admitted in our hospital from January 2013 to December 2015. They were evenly assigned to A, B or C group, 32 patients each. Patients in Group A suffered from cervical myelopathy and were treated by combined anterior and posterior approach. Patients in Group B group suffered from cervical vertebra disease and accepted a cervical corpectomy decompression and a bone graft fusion internal fixation surgery. Patients in Group C accepted conventional posterior decompression and fusion surgery for lateral mass screw fixation. Postoperative follow-up, X-ray intervertebral stability and fusion, neurological function JOA score and clinical efficacy of the effective date were compared. **Results:** JOA scores of all three groups were improved after 6 months. After a year, patients in Group A, B and C scored (16.3 ± 1.83) , (15.7 ± 1.15) and (15.59 ± 1.21) , respectively. The pairwise score differences between any two groups were statistically significant ($P < 0.05$). After one year's follow-up, the bone graft and internal fixation material had no signs of loosening, displacement or subsidence. The fusion rates of Group A, B and C reached 90.6%, 53.1% and 56.25%, respectively. Similarly, the pairwise differences in fusion rate between any two groups were statistically significant ($P < 0.05$). The clinical effectiveness was classified as apparent, effective, fair and invalid. The effective rates of Group A, B and C were 87.5%, 50% and 56.2%, respectively. The pairwise differences between any two groups were statistically significant ($P < 0.05$). **Conclusion:** Combined anterior and posterior approach surgery significantly improved the clinical efficacy than the other two surgeries.

Keywords: Anterior and posterior surgery combined therapy; Spinal cord type of cervical spondylosis; Clinical efficacy; Spinal nerve function

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1. Material and methods

1.1 General information. 96 patients with cervical spinal cord issues were randomly selected among all patients admitted in our hospital from January 2013 to December 2015. See **Table 1** for detail. According to the types of operation they accepted, they were divided into Group A (anterior combined therapy surgery), Group B (anterior cervical corpectomy decompression and interbody fusion and internal fixation) and Group C (posterior interbody fusion and lateral mass screw fixation treatment). Their cervical spinal cord issues were diagnosed by clinical methods including CT, MRI and other imaging examinations. Meanwhile, others diseases were excluded.

Table 1. Comparison of the general statistics of the 96 patients.

Gender	Cases (N)	Age range (mean \pm std dev)	Issue duration (mean \pm std dev)	P value
Male	58	36-67 (48.9 \pm 4.8)	1-5 years (22.5 \pm 2.9 months)	>0.05
Female	38	39-63 (45.9 \pm 3.7)	1-4 years (21.7 \pm 2.7 months)	>0.05

1.1.1 Symptoms and signs: Patients who suffer from cervical spondylosis commonly show symptoms like neck pain, numbness or weakness of the upper limbs, impaired hand fine movement and sexual disorder. Compression of the front spinal cord leads to movement dysfunction and lateral disorder manifested as sensory disturbance. The lower limb of the spinal cord after compression is lower than the upper limb. Normally, compression to the spinal cord will first affect the lower limb, and then induces increased muscle tension and even spastic paralysis. Patients can have Hoffman, Babinski positive signs and develop a feeling separation barrier, too.

1.1.2 Imaging manifestation: All patients were examined by X-ray, CT and MRI before admission. The X-ray showed anterior cervical lordosis and vertebral body bone hyperplasia. CT imaging showed spinal stenosis, calcification of intervertebral disc, and protrusion of lumbar intervertebral disc. MRI imaging showed spinal degeneration.

1.2 Research methods: All patients were admitted to the hospital research for routine inspection and preoperative examinations, such as blood routine, urine routine, liver function, kidney function, and the involvement of antibiotics to prevent bacterial infection. In the operation, the surgeon must ensure the patient's breathing unobstructed.

Procedure of the combined anterior and posterior operation for cervical spondylosis was described as followed:

- Let the patient (in Group A) lie in the supine position;
- Make a transverse incision on the right side of patient's neck to expose the vertebral body;
- Locate the vertebral lesion position;
- Drill in the intervertebral space in the vertical axis core;
- Scrap the vertebral bone hyperplasia and residual tissue;
- Adjust the bone column to the right and fix the AO plate with screws;
- Adjust the patient to a prone position;
- Make a median incision to the back of the neck;
- Separate the paraspinal muscle from the spine;
- Drill the lamina bone along the plate axis;
- Deplete the surface fat using a negative pressure drainage;
- Reposition the spine, then suture the wound.
- Provide antibiotics, saline and other supportive treatment to the patient
- Make a one-year follow-up.

Procedure of the anterior cervical corpectomy decompression and interbody fusion and internal fixation was described as followed:

- Let the patient (in Group B) lie in the supine position.
- Make a transverse incision on the right side of patient's neck to expose the vertebral body;
- Scrap the vertebral bone hyperplasia and remaining tissue;
- After decompression, drill the core vertically into the intervertebral space;
- place the titanium plate properly. Patients also give support to the treatment.

- Provide antibiotics, saline and other supportive treatment to the patient
- Keep following-up for one-year.

Patients in Group C were treated by routine posterior approach. Procedures described as following:

- Let the patient lie in the prone position.
- Make a median incision in the back of the neck;
- Separate the paraspinal muscles to reveal bilateral lamina;
- Punch into the spinous process and place the plate to the pivot;
- Position the plate next to the door-hinge at the root of the spine in ten silk threads;
- Cover the surface of the gelatin sponge.
- Drain the blood and fat of the wound than suture it.
- Give supportive treatment to the patient.
- Keep following-up for one year.

1.3 Research index: After the operation, the clinical treatment effect, X-ray cervical spine fusion and spinal nerve function were compared to evaluate the three operations. The clinical efficacy and spinal nerve function were measured by the JOA-17 method of the Japanese Department of orthopedics which is divided into four grades^[1]: (i) An increase of the post-operational JOA-17 score by more than 75% score was considered a significant improvement; (ii) an increase between 50-75% was considered effective; (iii) an increase between 25-50% was considered fair, and (iv) an increase <25% was considered ineffective. We used the X-ray to inspect the vertebral fixation and fusion. If loosening, displacement or subsidence was spotted, the operation was then considered a failure.

1.4 Statistical analysis: Statistic data were processed by SPSS v21.0, using χ^2 to test count data and t as the inspection standard. $P < 0.05$ indicated a statistical significance.

2. Result

2.1 The total effective ratio was calculated as the number of effective cases (both effective and markedly effective) divided by 32, i.e. the total case number of each group. It turned out Group A had the highest percent (87.5%) than Group B (50.0%) or C (56.2%). Any difference between them were statistically significant ($P < 0.05$, Table 2)

Table 2. Comparison of clinical efficacy between the three groups

Group	Cases (n)	Markedly effective	Effective	Fair	Ineffective	Effective rate
A	32	13	15	4	0	87.5%
B	32	1	15	14	2	50.0%
C	32	2	16	11	3	56.2%

2.2 Compared with pre-operative JOA scores of all three groups, those after the treatment increased significantly (Table 3). Also, patients in group A were superior to the other two groups in the recovery of neurological function ($P < 0.05$).

Table 3. Comparison of the score of JOA between the three groups

Group	Cases (n)	Preoperative	Six months after surgery	One year after surgery
A	32	7.3 ± 1.7	15.42 ± 1.38	16.3 ± 1.83
B	32	7.18 ± 1.4	14.13 ± 1.18	15.7 ± 1.15
C	32	6.89 ± 1.21	14.24 ± 1.42	15.59 ± 1.21

2.3 The X-ray manifestations of the three groups are also compared. The situation without loosening, displacement or subsidence was valid. 29 cases in group A were considered effective, accounting for 90.6%. Correspondingly, it was 17 cases for Group B (53.1%) and 18 cases for Group C (56.25%). All pairwise differences were significant ($P < 0.05$).

Table 4. Comparison of the effect of imaging examination between the three groups

Group	Cases (n)	Effective	Fair	Ineffective	Effective rate
A	32	29	3	0	90.6%
B	32	17	5	4	53.1%
C	32	18	9	5	56.25%

3. Conclusion

Cervical spondylosis causes not only neck pain, but also other symptoms including intermittent claudication, leg pain and bowel dysfunction. Cervical spondylotic myelopathy is the most critical one^[2]. At present the clinical use of simple anterior or posterior surgical treatment is not ideal to generate long-term effect^[3]. The combination of anterior and posterior cervical spine therapy however, can not only reduce the pressure but also reconstruct the structure of the cervical spine by bone grafting and fixation. Cases involved in this study showed good clinical results of combining anterior and posterior operations to treat cervical spondylotic myelopathy.

Patients who suffer from cervical spondylosis accept surgical treatment to increase the stability of the cervical segment and to improve the life quality. Cases reported in this study proved that treatment of the combination of anterior and posterior surgery can relieve the pressure of the front and rear cervical which is conducive to the recovery of the spinal cord function and spinal stability. Though comparison of the 96 cases in three groups, patients in group A were superior to the other two groups in terms of the total effective rate, spinal nerve function score and cervical fusion. It also accelerates the recovery after operation. Therefore, we would recommend to combine anterior and posterior operations in clinical application.

Reference

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