



The effect of locating and sliding of facet combined with percutaneous endoscopic lumbar discectomy on cell inflammatory indicators and the treatment of disc herniation

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ABSTRACT

This study aimed to investigate the effects of IL-8, CRP and TXB2 in the treatment of lumbar disc herniation by combining with percutaneous endoscopic discectomy. For this purpose, 290 patients with disc herniation were selected as the research objects and randomly divided into two groups. The control group was treated with traditional intervertebral fenestration of nucleus pulposus, and the research group was treated with joint process location slip technique combined with percutaneous endoscopic lumbar disc discectomy. The clinical efficacy, functional scores and serological indexes of the two groups were compared, and the prognostic value of IL-8, CRP and TXB2 in the treatment of disc herniation by the combination of the sliding technique of facet location and percutaneous endoscopic discectomy was explored. The results showed that the total effective rate of 95.55% in the study group was higher than 79.31% in the control group, and the difference was significant ($P < 0.05$). The operative time, incision length, length of hospital stay and intraoperative blood loss in the study group were lower than those in the control group ($P < 0.05$). JOA score was higher and ODI score was lower in the two groups after surgery than before surgery, and JOA score in the study group was higher than that in the control group, while the ODI score was lower than that in the control group ($P < 0.05$). IL-8, CRP and MDA in 2 groups increased after the operation, while SOD and TXB2 decreased significantly. IL-8, CRP, TXB2 and SOD in the study group were lower than those in the control group, while MDA was higher than those in the control group ($P < 0.05$). ROC curve indicated that the areas under the curves of IL-8, CRP and TXB2 were 0.725, 0.835 and 0.880, and the areas under the curves, sensitivity and specificity of the combined determination were higher than those of any index ($P < 0.05$). In general, compared with traditional interlaminar fenestration of nucleus pulposus, combined with percutaneous endoscopic lumbar disc discectomy has a significant effect on the treatment of disc herniation, and can reduce the levels of IL-8, CRP and TXB2.

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Introduction

Lumbar intervertebral disc herniation is one of the main diseases affecting the health of Chinese citizens. According to relevant research statistics, approximately 70%~85% of adults and 5% of adolescents have related symptoms, and approximately 20% of patients are diagnosed with lumbar disc herniation (1, 2). The clinical treatment for lumbar disc herniation is mainly surgical treatment, and the type of surgery is generally determined by the degree of nucleus pulposus herniation, symptoms and the surgeon's proficiency in the surgical method, to remove or fuse the disc to relieve the compression of the spinal cord nerves (3). With the rapid development of imaging and other

medical technologies, the surgical treatment of lumbar disc herniation has gradually developed from the traditional development of treatment to minimally invasive spine surgery. In addition, under the role of MRI, CT, ultrasound and other imaging methods, the pain root, compressed nerve root and degenerative disc location of patients were diagnosed, and appropriate surgical methods were developed (4). Percutaneous spinal instrumentation is a common surgical method for the treatment of lumbar disc herniation, the key of which must be the accuracy of puncture. In order to accurately puncture the tip of the superior articular process, the traditional method often requires repeated fluoroscopy, which has the disadvantage of large radiation (5). Facet slip

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technique is a new method of puncture to the apex of the superior facet. At present, studies have confirmed the feasibility of this technique combined with minimally invasive technique in the treatment of lumbar disc withdrawal. IL-8, CRP and TXB2 are all cellular inflammatory factors, and the occurrence and development of lumbar disc herniation will lead to the increase of the levels of these factors (6-8). However, there is no relevant study to explore the role of IL-6, CRP and TXB2 in the treatment of lumbar disc herniation with facet location slip combined with percutaneous endoscopic discectomy. In this study, 290 patients with disc herniation in our hospital were selected as the research objects to explore the efficacy and the effects on IL-6, CRP and TXB2. The results are as follows.

Materials and methods

General Information

A total of 290 patients with intervertebral disc herniation admitted to our hospital from April 2018 to August 2021 were selected as the study subjects and randomly divided into 2 groups with 145 patients in each group. Patients in the control group were treated with traditional open decompression and fusion, while patients in the research group were treated with joint process location and slip technique combined with percutaneous endoscopic lumbar discectomy. In the control group, there were 62 males and 83 females, with an average age of 43.15 ± 15.13 years and an average course of disease of 22.19 ± 5.13 months. There were L4-S44 cases of disc herniation, L5-S165 cases, L4-5-S136 cases. In the study group, there were 69 males and 78 females, with an average age of 44.15 ± 12.13 years and an average course of disease of 23.29 ± 3.13 months. There were 46 cases of L4~5, 168 cases of L5~ S and 31 cases of L4~5~S1. There was no significant difference in age, gender, course of the disease and disc herniation between the two groups ($P > 0.05$), indicating comparability.

Inclusion and exclusion criteria

Inclusion criteria :(i) all patients met the clinical diagnostic criteria for lumbar disc herniation (9); (ii) Normal immune function without genetic diseases; (iii) Age ≥ 20 years; (iv) Patients who can tolerate the surgical procedures and drugs in this study; (v)

Informed consent was signed by patients and their families.

Exclusion criteria :(i) pregnant or lactating women; (ii) patients with spinal tuberculosis, rheumatoid arthritis and other diseases; (iii) organic lesions of brain, heart, liver, kidney and other organs; (iv) those who have taken relevant therapeutic drugs recently; (v) persons with mental illness.

Research Methods

Patients in the control group were given conventional tracheal intubation and general anesthesia, and were placed in prone position and padded on both sides of chest and waist, followed by routine disinfection and towel spreading. Preoperative CT was used to determine the location of the affected vertebra. Intraoperative incisions were made at the spinous process of the patient's affected vertebra, and the skin, lumbar fascia and other tissues were cut layer by layer until the joints of the patient's affected vertebra. C-arm CT was used to determine the damaged intervertebral space. A window was opened, and the upper edge of the upper lamina was gnawed with surgical forceps until the patient's nerve roots and dural sac were exposed, exposing the patient's disc herniation. The herniated disc is then removed and the tissue around the patient's nerve root is removed, leaving the patient with loose nerve roots and the dural sac filled. The patient's incision was then cleaned, hemostasis was performed, a drainage tube was placed, the incision was sutured, and dressings were wrapped. Two days after surgery, the drainage tube was removed according to the patient's drainage condition, and the patient was encouraged to exercise waist function.

Patients in the study group were treated with joint process localization and sliding technique combined with percutaneous endoscopic lumbar disc discectomy. Patients were placed in the prone position, and the puncture point and puncture route were determined by CT machine before surgery. Then local anesthesia was given to the patient, and the puncture needle was selected according to the patient's situation. During the puncture, the position of the patient's upper articular process was aligned. After touching the patient's bony nodules, the tip of the needle was moved downward. The expansion tube was placed through the guide wire, and the expansion tube was held down along the articular

process until it reached the patient's intervertebral foramen. After fluoroscopic observation again, the protective cannula was placed, and the tip of the protective cannula was placed in a reasonable position inside the intervertebral foramen. A ring saw was inserted to remove the ventral side of the superior articular process, replace the protective cannula, and connect the endoscopic system. Adjust the working Angle according to the need, and use the nucleus pulposus forceps to extract the protruding nucleus pulposus tissue, expose the compressed nerve root, bite off the surrounding tissue, relax sufficiently, relieve the compression. Radiofrequency ablation was then used to stop the bleeding.

Observation Indicators

Clinical efficacy evaluation and recovery: the patient's symptoms of lumbar and leg pain disappeared and could resume normal work with straight leg elevation of more than 70°; The patients' waist activity function was improved and the symptoms of waist and leg pain were significantly reduced. Unhealed: The patient's symptoms or signs have not improved. The sum of recovery rate and recovery rate is denoted as the total effective rate (10).

Clinical data were evaluated, including operative time, incision length, length of hospital stay, and intraoperative blood loss.

Japanese Orthopaedic Association (JOA) score (11) and Oswestry Disability Index (ODI) score (12) were used to evaluate the preoperative and postoperative functional scores. The full score of JOA is 29, with < 10 being poor, 10-15 medium, 16-24 good and 25-29 excellent. ODI score is composed of 10 questions, mainly including pain intensity, self-care, lifting, walking, sitting, standing, sleep disturbance, sexual life, social life and travel. Each question has 6 options and the highest score is 5. The higher the score is, the more serious the patient's disease will be.

Serum inflammatory factors were measured. 5ml of fasting elbow venous blood was extracted from the patient 1d before surgery and 5d after surgery and centrifuged at 3000r/min for 15min. The inflammatory indicators were determined by ELISA, namely the levels of IL-8, CRP and TXB2 in serum, as well as the levels of oxidative stress indicators SOD and ROS.

Statistical methods

SPSS20.0 statistical method was used for data processing. The comparison of measurement data between the two groups was expressed by standard deviation \pm mean and t-test was adopted. The count data between the two groups were expressed as n or percentage and the chi-square test was used. ROC curve was used to determine the predictive efficacy of IL-8, CRP and TXB2 on postoperative prognosis, and $P < 0.05$ was considered as a statistically significant difference.

Results and discussion

Efficacy evaluation of the two groups

The total effective rate of 95.55% in the study group was significantly higher than 79.31% in the control group, and the difference was statistically significant ($P < 0.05$), as shown in Table 1.

Table 1. Efficacy evaluation of the two groups

Group	Study group (n=145)	Control group (n=145)	X ²	P
healing	92	37		
Improve	48	78		
Ill	5	30		
Total	96.55%	79.31%	8.413	0.005

Clinical data analysis of the two groups

The operative time, incision length, hospital stay and intraoperative blood loss of patients in the study group were significantly lower than those in the control group, and the differences were statistically significant ($P < 0.05$), as shown in Table 2.

Table 2. Intraoperative data analysis of the two groups

Group	Study group (n=145)	Control group (n=145)	t	P
Operation time (min)	91.52 \pm 5.39	104.82 \pm 10.93	16.65 4	0.001
Incision Length (cm)	1.75 \pm 0.25	12.19 \pm 1.15	15.31 4	0.001
Length of hospital stay (D)	6.85 \pm 1.55	14.57 \pm 3.72	14.21 3	0.001
Intraoperative blood loss (ml)	12.19 \pm 3.22	77.69 \pm 12.51	15.74 9	0.001

Comparison of lumbar function scores between the two groups

There were no statistically significant differences in JOA score and ODI score between the two groups before surgery ($P>0.05$), JOA score in the two groups was significantly increased after surgery, while ODI score was significantly decreased. The JOA score of the study group was significantly higher than that of the control group, and the ODI score was significantly lower than that of the control group, with statistical significance ($P<0.05$), as shown in Table 3.

Table 3. Comparison of lumbar function scores between the two groups

Group		Study group (n=145)	Control group (n=145)	t	P
JOA score	Preoperative	15.32 ± 2.75	15.81 ± 2.11	0.842	0.057
	Postoperative	23.92 ± 2.18	19.16 ± 2.15	5.346	0.013
ODI score	Preoperative	40.05 ± 2.18	39.45 ± 5.31	0.746	0.169
	Postoperative	10.54 ± 2.73	15.16 ± 3.22	6.741	0.005

Comparison of serum inflammatory factors between the two groups

There were no statistically significant differences in the levels of IL-8, CRP and TXB2 between the two groups before surgery ($P>0.05$). The levels of IL-8 and CRP in the two groups were significantly increased after surgery, while THE levels of TXB2 were significantly decreased. Moreover, il-8, CRP and TXB2 in the study group were significantly lower than those in the control group, and the differences were statistically significant ($P<0.05$), as shown in Table 4.

Comparison of oxidative stress indexes between the two groups

There were no statistically significant differences in SOD and MDA between the two groups before surgery ($P<0.05$). SOD level in the study group was lower than that in the control group, while MDA level was higher than that in the control group, with statistical significance ($P<0.05$), as shown in Table 5.

Table 4. Comparison of serum inflammatory factors between the two groups

Group		Study group (n=145)	Control group (n=145)	t	P
IL-8	Preoperative	35.25 ± 5.19	34.18 ± 6.17	0.842	0.739
	Postoperative	37.28 ± 3.14	40.18 ± 9.65	9.842	0.001
CRP	Preoperative	8.65 ± 1.14	8.19 ± 1.39	0.855	0.643
	Postoperative	9.13 ± 1.29	10.29 ± 1.28	6.418	0.012
TXB2	Preoperative	41.15 ± 5.28	42.13 ± 4.16	0.947	0.246
	Postoperative	24.25 ± 3.14	28.95 ± 4.16	9.416	0.013

Table 5. Comparison of oxidative stress indexes between the two groups

Group		Study group (n=145)	Control group (n=145)	t	P
SOD	Preoperative	362.15 ± 57.56	360.59 ± 58.44	0.842	0.715
	Postoperative	262.62 ± 38.45	300.13 ± 36.18	9.845	0.001
MDA	Preoperative	7.76 ± 1.15	7.82 ± 0.93	0.946	0.675
	Postoperative	24.15 ± 3.46	14.58 ± 2.53	8.415	0.001

Evaluation of the prognostic efficacy of il-8, CRP and TXB2 in combination with percutaneous endoscopic lumbar discectomy for predicting facet location slip

The area under the curve, sensitivity and specificity of il-8, CRP and TXB2 were all higher than those of any index, and the differences were statistically significant ($P<0.05$), as shown in Figure 1.

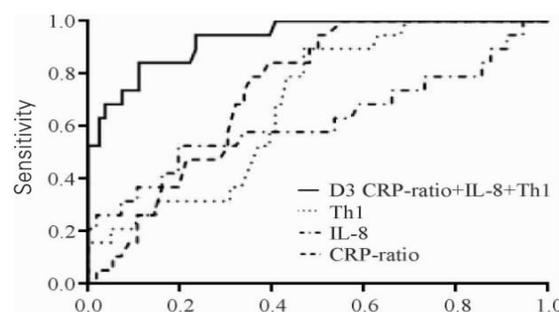


Figure 1. Prognostic efficacy evaluation of IL-8, CRP and TXB2 for predicting facet location slip combined with percutaneous endoscopic lumbar discectomy

Lumbar intervertebral disc herniation is a comprehensive disease mainly caused by lumbar intervertebral disc herniation, nucleus pulposus herniation and annulus fibrosus rupture, which further stimulates and compresses the nerve root of the patient, leading to waist and leg pain (13). According to studies, the occurrence of this disease is mainly closely related to intervertebral disc degeneration, involved injury, pregnancy, genetic factors and abnormal development (14), and surgical treatment is required when it reaches a certain level. The surgical method used in the past is to relieve the nerve compression by open surgery, and the curative effect is accurate. However, with the development of minimally invasive techniques in orthopedics, the application of percutaneous endoscopy can bring less damage and faster recovery time for discectomy (15).

The treatment of endoscopic lumbar discectomy requires the accuracy of puncture, that is, the puncture needle can reach the tip of the patient's superior articular process completely (16). Because of the particularity of the human traumatic articular body, it can be found that the tip is an obviously inclined plane with low stability after the posterolateral puncture. Therefore, the puncture needle is easy to slip into the patient's foramina after implantation, resulting in damage to the patient's dural sac and nerve root. As a result, during the actual clinical operation, doctors often need to perform multiple X-ray fluoroscopy the operation, which not only prolongs the operation time but also increases the radiation dose of patients (17, 18). In the process of locating the facet, the tip of the dilator is applied to the dorsal side of the superior facet. Then according to the hand phase of the ventral slide, by hand to determine whether the tip of the dilator reached the intervertebral foramen, and repeated sliding to determine the accurate behavior, and then inserted the ring saw, the endoscope connection. This technique significantly reduces the number of fluoroscopes, surgical time, and exposure time to radiation.

The results of this study showed that the total effective rate of the study group was 95.55%, which was significantly higher than that of the control group (79.31%), and the operation time, incision length, hospital stay and intraoperative blood loss of the study group were significantly lower than that of the control

group. JOA score was significantly increased and ODI score was significantly decreased in the two groups after surgery, and JOA score in the study group was significantly higher than that in the control group, while the ODI score was significantly lower than that in the control group. Studies have shown that compared with small incision interlaminar fenestration, percutaneous endoscopic spinal nucleus pulposus excision for elderly LDH patients has less surgical trauma, fewer complications and better postoperative lumbar function recovery (19). Some studies have also shown that percutaneous endoscopic interlaminar discectomy is characterized by less surgical trauma, less blood loss, short bed time, fast recovery, and better relief of postoperative low back pain symptoms, which is worthy of further popularization in clinical work (20). The above results were consistent with the results of this study, which confirmed the effectiveness of the joint process location slip technique combined with percutaneous endoscopic lumbar disc discectomy in the treatment of lumbar disc herniation. Minimally invasive surgery will not extensively separate the patient's spinal muscles and adjacent tissues, will not bring large body injury to the patient, nor will it affect the stability of the patient's spine, so that the patient can resume exercise as soon as possible, and thus improve the clinical efficacy and corresponding functional score.

CRP, IL-8 and TXB2 are all important indicators of inflammatory stress in the human body. After the occurrence of the inflammatory response, the above inflammatory factors will be increased to varying degrees. Among them, IL-8 is a chemotactic cytokine secreted by TH1, and the increase of this cytokine level can promote the process of inflammatory response. Promote the synthesis of acute proteins and the release of inflammatory mediators (21). CRP is a common marker of the inflammatory response, which tends to increase after infection or trauma and decrease rapidly after recovery (22). TXB2 is a specific marker of platelets in the body, and the increase of the level can lead to vascular spasm and thrombosis in patients with lumbar disc herniation, resulting in neuroinflammatory response (23). SOD and MDA are common markers of oxidative stress (24). The results of this study indicated that il-8, CRP and MDA in the two groups were significantly increased after surgery, while SOD and TXB2 were

significantly decreased. In the study group, IL-8, CRP, TXB2 and SOD were significantly lower than those in the control group, while MDA was significantly higher than those in the control group. Studies have shown that as a minimally invasive spinal surgery, a percutaneous foraminal endoscopic nuclear pulpotomy can reduce the serum LEVELS of TXB2, PGE2 and IL-6 in patients with lumbar disc herniation, relieve the symptoms of low back pain, and benefit the recovery of lumbar spine function, which is worthy of popularization and application (25). The above results are consistent with the results of this study, which all confirmed that compared with traditional interlaminar fenestration of nucleus pulposus, joint process location slip combined with percutaneous endoscopic lumbar disc discectomy for disc herniation can more effectively reduce the level of inflammatory factors and oxidative stress response. In this study, the increase of IL-8, CRP and MDA may be due to the intensification of inflammatory and oxidative stress reactions related to surgical trauma, increasing IL-8 and CRP, while the increase of MDA is due to the rapid consumption of SOD caused by oxidative stress, increasing MDA products (26). In addition, due to the difference in postoperative trauma, IL-8, CRP, TXB2 and SOD in the study group were significantly lower than those in the control group, while MDA was higher than that in the control group.

Finally, the results of this study indicated that the areas under ROC curve of IL-8, CRP and TXB2 were 0.725, 0.835 and 0.880, and the combined determination of areas under ROC curve, sensitivity and specificity were all higher than any index, indicating that IL-8, CRP and TXB2 can be used to predict the prognosis of percutaneous endoscopic lumbar discectomy, which needs to be confirmed.

In conclusion, compared with traditional interlaminar fenestration of nucleus pulposus, combined with percutaneous endoscopic lumbar disc discectomy has a significant effect on the treatment of disc herniation, and can reduce the levels of IL-8, CRP and TXB2.

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None.

Interest conflict

The authors declare no conflict of interest.

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