ANALYSIS OF CLINICAL EFFICACY, INFLAMMATORY FACTORS, AND INFLUENCING FACTORS OF RECURRENCE OF LUMBAR DISC HERNIATION THROUGH TRANSFORAMINAL/ INTERLAMINAR APPROACH UNDER SPINAL ENDOSCOPY

Wei Sun[1], Wenjie Yu[2], Guangliang Hu[3*]
[1]Sports medicines, Qilu Hospital of Shandong University (Qingdao), Qingdao, 266011, China - [2]Department of Orthopedics, Rushan People's Hospital, Weihai, 264500, China - [3]Department of Orthopedics, Qing Dao Municipal Hospital, Qingdao, 266087, China

ABSTRACT

Objective: *To analyze the clinical efficacy, inflammatory factors, and recurrence factors of lumbar disc herniation (LDH) treated by endoscopic transforaminal/interlaminar approach.*

Methods: *From April 2016 to May 2018, 204 patients with lumbar disc herniation who received different endoscopic approaches in our hospital were selected and divided into the transforaminal approach group (98 cases) and the interlaminar approach group (106 cases) according to the operation methods. The excellent and good rates of the two groups were evaluated 3 months after operation; the levels of inflammatory factors in the two groups were detected before and one week after the operation. According to the recurrence within 2 years, the patients were divided into nonrecurrence group and the recurrence group.*

Results: *Three months after the operation, the clinical efficacy of the two groups was evaluated. The excellent and good rate of the transforaminal approach group was 95.92%, and that of the intervertebral disc approach group was 93.40%. There was no significant difference between the two groups (P>0.05). The levels of CRP, CK, and IL-6 in group A were significantly lower than those before the operation (P<0.05), but there was no significant difference between the two groups (P>0.05). Among 204 patients, 12 patients relapsed within 2 years, and the recurrence rate was 5.88%. Univariate analysis showed that the Modic sign, VAS score before and after operation difference, and JOA score improvement rate were the factors influencing postoperative recurrence of lumbar disc patients (P<0.05). Logistic regression analysis showed that Modic change was a risk factor for postoperative recurrence of lumbar intervertebral disc patients, and the improvement rate of JOA score was a protective factor for postoperative recurrence of lumbar intervertebral disc patients (P<0.05).*

Conclusion: *endoscopic transforaminal/interlaminar approach is effective in the treatment of lumbar disc herniation, and the clinical approach should be determined according to the anatomical characteristics to ensure the therapeutic effect; Modic change is a risk factor for postoperative recurrence of patients with lumbar intervertebral disc, intervention measures should be taken to reduce the recurrence rate.*

Keywords: *Spinal endoscopy, transforaminal approach, interlaminar approach, lumbar disc herniation, efficacy, inflammatory factors, recurrence.*

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Introduction

Lumbar disc herniation is a common clinical degenerative lesion of the spine, mainly due to the lumbar disc pullary nucleus, fiber ring, cartilage plate, and other parts are damaged under the action of external factors, stimulate or compress the adjacent spinal nerve root, thus producing waist pain, one lower limb or bilateral lower limb numbness and other clinical symptoms, imaging common L4~L5 and L5~S1 lesions, good in the middle-aged and elderly people[(1-2)]. In recent years, with the popularization of computers, work and life lifestyle changes, the incidence of lumbar disc herniation is gradually becoming younger, bringing a serious impact on the quality of life of patients. At present, most lumbar disc herniation patients can be cured after conservative treatment, but there

are still some patients who need to take surgery to remove the compression of the spinal cord and nerve rootusing surgical methods including the posterior intervertebral disc pulloid removal, or combined with fusion fixation or fusion fixation, but due to large trauma, postoperative recovery time, clinical application is limited to a certain extent[3].

With the further understanding of the concept of minimally invasive, percutaneous spinal endoscopic myeloid enucleation has become one of the most commonly used minimally invasive treatments of lumbar disc herniation. With less blood loss, small postoperative pain, and rapid recovery, it can retain the integrity of the spinal ligament complex, reduce the incidence of postoperative complicationsand , gradually become the development trend of minimally invasive spinal surgery[4]. The two most used approches in clinics are the foraminal approach and the laminate approach, which should be the earliest at home and abroad. At present, there are still certain clinical[5] about the scope of application, treatment effect, and complications of the latter. In this study, the clinical efficacy, inflammatory factors and relapse influencing factors of lumbar disc herniation were analyzed by analyzing the spinal endoscopic transforamen/laminar approach.

Data and methods

General information

A total of 204 patients with lumbar disc herniation treated with different endoscopic spinal approach procedures in our hospital from April 2016 to May 2018 were selected.

Inclusion criteria:

• All patients whomet the diagnostic criteria for lumbar disc herniation recommended in Anhui Province (2015)[6];

• The patient was 18 to 80 years old, and had low back pain, one lower limb radiation pain and other symptoms;

• It was suitable for endoscopic nuclear pulposus resection;

• The patients failed after 2~3 months of regular conservative treatment;

• Preoperative imaging data were complete;

• Both patients and their families gave informed consent to participate in this study.

Exclusion criteria:

• Complicated with serious medical diseases;

• Imaging showed multilevel disc herniation, lumbar spondylolysis and lumbar spondylolisthesis;

• Complicated with lumbar tumor, tuberculosis, spinal stenosis, fracture, infection;

• Patients with previous lumbar surgery history;

• Bilateral symptoms and cauda equina syndrome;

• Those who cannot tolerate surgery.

According to the surgical methods, the patients were divided as follows: 98 cases in the transforaminal approach group and 106 cases in the transforaminal approach group. In the transforaminal approach group, there were 59 males and 39 females, aged from 18 to 80 years, with an average age of (49.10±11.02) years, and the disease course was (5.67±3.12) months.

The position of disc herniation was central in 35 cases and paracentral in 63 cases. In the interlaminal approach group, there were 64 males and 42 females, aged from 18 to 80 years, with an average age of (48.79±11.63) years, and the course of the disease was (6.14±3.41) months. The location of disc herniation was central in 37 cases and para-central in 69 cases. There was no significant difference in general data between the two groups (P>0.05).

Surgical methods

In the transforaminal approach group, patients were placed in a prone position with abdominal support for the lumbar bridge. A preoperative examination was conducted to check whether the c-arm fluoroscopy machine could rotate freely to take lumbar X-ray films. The spinous process line and iliac crest line were marked, c-arm fluoroscopy was used to locate the window projection of the L5-S1 interlaminar ligamentum luteum, and the puncture point was determined according to the preoperative imaging adjustment.

Conventional antiseptic wipes, 1% lidocaine puncture under local anesthesia, adjust the Angle of the needle under the perspective of needlepoint to articular process on tips, remove the needle retaining thread, the puncture point cut 0.8 cm, using trephine enlarge intervertebral foramen, placing expansion sleeve to the surface of yellow ligament, casing into work, perspective to determine the correct position after confirm the gap and the sleeve position. Selective link intervertebral foramen mirror system clean and pathological nucleus pulposus tissue around nerve root, until you can clearly see that the fat tissue around longitudinal ligaments and nerve root, take out after showing outstanding intervertebral disc nucleus pulposus fully, and probe again oppressive nerve root, the existence of residual nucleus pulposus

tissue bipolar radiofrequency help stop bleeding, in fiber ring forming, incision suture needle 1.

Through the interlaminar approach, the patient was placed in prone position with a u-shaped abdominal pad, the dorsal midline was marked along the spinous process, and the projection was made on the surface of the iliac spine. C-arm fluoroscopy confirmed the lesion segment, and the puncture point was the line between the upper edge of S1 superior articular process and the target of L5-S1 disc herniation. The midline of spinous process was 12-14cm. Local anesthesia with 1% lidocaine was performed along the superior articular process S1 to the target site, from the superior articular process S1 to the posterior upper edge of the S1 vertebral body on lateral radiographs.

The skin was cut about 0.8cm with the guide needle as the center, and the deep fascia was cut, and the expansion cannula and working cannula were placed through the guide needle. Foraminoplasty was performed with a ring saw under C-arm fluoroscopy, and Wolf foraminoscopy was placed. The surrounding soft tissues were removed, nerve roots and dural sac were carefully examined, and the prominent nucleus pulposus tissues were removed. After good nerve root pulse, hemostasis was performed with bipolar radiofrequency assisted, and annulus fibroplasty was performed, and the incision was sutured for 1 needle.

Observation indicators

Improved Macnab standard was used to evaluate the good rate of the two groups 3 months after operation. Serum LEVELS of C-reactive protein (CRP), Creatine kinase (CK) and interleukin-6 (IL-6) in 2 groups were detected by enzyme-linked immunosorbent assay before and one week after surgery. Patients were divided into non-recurrence group and recurrence group according to their recurrence within 2 years. General data of age, gender, and occupation were collected, and imaging data were reviewed to collect Modic change, lesion segment, approach, Modic change, VAS score, and improvement rate of JOA score.

Statistical methods

SPSS21.0 software package was used for the analysis of data in this study, measurement data were expressed by ($\bar{x}\pm s$), t was used to test the comparison of data between the two groups, all count data were expressed by [N (%)], χ^2 or Fisher was used to accurately test the comparison of data between the two groups. Logistic regression analysis of risk factors for postoperative recurrence of lumbar disc patients, $P<0.05$ was considered to be statistically significant.

Results

Comparison of clinical efficacy 3 months after surgery between the two groups

Three months after surgery, the clinical efficacy of the two groups was evaluated. The excellent and good rate of the transforaminal approach group was 95.92%, and the excellent and good rate of the transforaminal approach group was 93.40%, and the difference between the two groups was not statistically significant ($P>0.05$). See Table 1.

Group	n	Excellent	Good	Medium	Poor	Excellent and good rate
Intervertebral foramen group	98	40 (40.82)	54 (55.10)	3 (3.06)	1 (1.02)	94 (95.92)
Intervertebral disc group	106	47 (44.34)	52 (49.06)	5 (4.72)	2 (1.89)	99 (93.40)
χ^2						0.635
P						0.426

Table 1: Comparison of clinical efficacy 3 months after surgery between the two groups.

Comparison of levels of inflammatory factors between the two groups before and after surgery

There was no significant difference in preoperative CRP, CK and IL-6 levels between 2 groups ($P>0.05$), the levels of CRP, CK, and IL-6 in the 2 groups were significantly lower than those before the surgery 1 week after surgery ($P<0.05$), there was no significant difference between the two groups ($P>0.05$). See Table 2.

Group	n	Time	CRP (mg/L)	CK (U/L)	IL-6 (ng/L)
Intervertebral foramen group	98	Before surgery	1.52±0.68	78.02±7.06	2.41±0.75
		1 week after surgery	0.85±0.13*	57.26±5.47*	1.33±0.48*
Intervertebral disc group	106	Before surgery	1.66±0.74	76.14±7.70	2.45±0.53
		1 week after surgery	0.84±0.21*	57.30±6.12*	1.28±0.37*

Table 2: Comparison of levels of inflammatory factors between the two groups before and after surgery.

Univariate analysis of factors affecting postoperative recurrence of lumbar disc patients

Among 204 patients, 12 patients had recurrence within 2 years, and the recurrence rate was 5.88%. Univariate analysis showed that the Modic sign,

the difference between VAS score before and after the operation, and the improvement rate of JOA score were all factors influencing the postoperative recurrence of lumbar disc patients (P<0.05). See Table 3.

Clinical data		Recurrence group (n=192)	Relapse group (n=12)	χ^2/t	*P*
Age (years)		49.13±13.24	47.52±9.81	0.414	0.680
Gender (Male/female)		95/97	4/8	1.179	0.278
Professional	Heavy manual	57 (29.69)	2 (16.67)		0.627*
	In the physical	94 (48.96)	7 (58.33)		
	Light manual	41 (21.35)	3 (25.00)		
Modic changes	without	125 (65.10)	3 (25.00)		0.021*
	I type	3 (1.56)	0 (0.00)		
	II type	60 (31.25)	9 (75.00)		
	III type	4 (20.83)	0 (0.00)		
Lesions in the segments	L4~L5	106 (55.21)	9 (75.00)	1.799	0.180
	L5~S1	86 (44.79)	3 (25.00)		
Type	Intervertebral foramen	79 (41.15)	4 (33.33)		0.593*
	Intervertebral disc	113 (58.85)	8 (66.67)		
Highlight the type	Highlight the type	52 (27.08)	0 (0.00)		0.113*
	Type out	69 (35.94)	6 (50.00)		
	Free type	71 (36.98)	6 (50.00)		
VAS scored of Preoperative and postoperative		6.80±0.89	5.62±1.87	2.167	0.031
JOA improvement rate (%)		0.82±0.16	0.61±0.28	2.568	0.011

Table 3: Univariate analysis of factors affecting postoperative recurrence of lumbar disc patients.
**denotes Fisher's accurate test.*

Logistic regression analysis of risk factors affecting postoperative recurrence of lumbar disc patients

Logistic regression analysis showed that Modic was a risk factor for postoperative recurrence of lumbar disc patients, and the improvement rate of JOA score was a protective factor for postoperative recurrence of lumbar disc patients (P<0.05) as shown in Table 4.

Relevant factor	β	SE	Wald	P	OR	95%CI
Modic changes	1.115	0.560	4.013	0.023	3.061	1.014~9.260
VAS scored of Preoperative and postoperative	-0.345	0.513	17.351	0.091	0.712	0.453~1.059
JOA improvement rate	-3.952	0.775	16.142	0.024	0.020	0.004~0.753

Table 4: Logistic regression analysis of risk factors affecting postoperative recurrence of lumbar disc patients.

Discussion

The traditional open surgery in the treatment of lumbar intervertebral disc protrusion approach, compared to the developed approach in recent years the spine endoscopic excision of nucleus pulposus is more and more accepted by clinical physicians and patients. A large number of studies have been done to confirm its curative effect. It has small trauma, less intraoperative blood loss, shorter operation time, fewer perspectives and fast recovery[7-8]. Local operation avoids complications that may occur under general anesthesia, reduces the formation of scar tissue in the spinal canal, and retains the original lumbar anatomical structure and biomechanical stability. With the improvement of minimally invasive surgical techniques and instruments, endoscopic spinal nuclear pulpotomy is divided into the interforaminal approach and the interlaminar approach[9-10]. The foraminal approach directly reaches the posterior part of the vertebral body and between the dural sac through its working channel, fully exposing the posterior ligaments and nerve roots, and providing spinal canal decompression on the ventral side of the dural sac. The transforaminal approach can significantly reduce intraspinal tissue and lumbar stability injuries and has a wide range of clinical applications[11]. However, it also has certain disadvantages. It is difficult to operate for free prolapse or highly displaced lumbar disc herniation, and due to the special anatomical position of L5-S1, it is difficult for some patients to pass through the intervertebral foramen due to iliac block working trocar. For some patients with interforaminal osteophytes, the interforaminal approach is often used to drill osteophytes, compress the outlet nerve, and induce nerve root stimulation symptoms[11-13].

Between vertebral plate into the road treatment was first used in the high iliac crest, patients with the larger transverse process, the main work is placed at 1 cm hole casing, from the vertebral canal by vertebral plate clearance back to highlight the nucleus pulposus tissue. It is the familiar way for the vast majority of spine surgeons that can effectively avoid vertebral side muscle injury and intervertebral foramen osteophyte drill, under a state of relative look do thorough decompression, and alleviate the symptoms of nerve root stimulation[14]. Some scholars have found that due to the presence of the iliac crest, the quality of patients with lumbar disc herniation of L5-S1 central type is more difficult than THAT of L4-L5, which can be treated by translaminar

approach[15]. In this study, patients with lumbar disc herniation were treated by transforaminal approach and translaminar approach respectively. The clinical efficacy of the two groups was evaluated 3 months after surgery. The excellent and good postoperative rate of the transforaminal approach group was 95.92%, and the excellent and good postoperative rate of the transforaminal approach group was 93.40% ($P>0.05$), the levels of CRP, CK, and IL-6 in 2 groups were significantly lower than those before surgery 1 week after surgery ($P<0.05$), indicating that the two types of spinal endoscopy in the treatment of lumbar disc herniation have good clinical efficacy.

Relevant literature defined recurrence as the obvious relief of nerve root symptoms after endoscopic surgery, and the recurrence of root symptoms one week later. MRI examination revealed that the original disc herniated again, compressed or squeezed ipsilateral and contralateral nerve tissues[16]. The recurrence criteria of this study were as follows: the preoperative diagnosis was clear, and once the nerve root irritation symptoms appeared again after surgery and the lumbar MRI examination confirmed that the same segment of the disc was herniated again, the postoperative recurrence cases were identified. In this study, there were 12 patients with recurrence within 2 years among 204 patients, and the recurrence rate was 5.88%.

Logistic regression analysis showed that Modic was a risk factor for postoperative recurrence of lumbar disc patients, and the improvement rate of JOA score was a protective factor for postoperative recurrence of lumbar disc patients ($P<0.05$).

Conclusion

In conclusion, endoscopic spinal transforaminal/interlaminar approach is effective in the treatment of lumbar disc herniation, and the approach should be determined according to the anatomical characteristics to ensure the therapeutic effect. Modic change is a risk factor affecting postoperative recurrence of lumbar disc patients, corresponding intervention measures should be given to reduce the recurrence rate.

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Corresponding Author:
Guangliang Hu
Email: gongqiao18639705@163.com
(China)