

LETTER TO THE EDITOR

Clinical Application of Interbody Fusion Combined with Articular Process Screw Aiming Device in the Treatment of Senile Lumbar Disc Herniation Combined with Lumbar Fracture

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Multiple factors such as the increase of ages, long-term burden, change of intervertebral disc structure and the denaturation of nucleus pulposus are all main causes of the frequent occurrence of elder protrusion of lumbar intervertebral disc. Since the operation risk on elder patients with protrusion of lumbar intervertebral disc in combination with fracture of lumbar vertebra is high, the stability of vertebrae is low, the insertion of internal fixations is the necessary testify as well as the condition of high occurrence rate of complications. Therefore, the clinical researches of treating elder protrusion of lumbar intervertebral disc and fracture of lumbar vertebra by posterior lumbar intervertebral fusion in combination with interarticular screw sighting device was carried out in our hospital, and it received a relatively good result.

I Introduction

Kaijun Yu, Ruiyi Gong, Longjie Sun, Xiaotao Wang. "Effects of Health Literacy on Health Promotion Behavior and Medical Ecology Resource Utilization" on Issue 107, Pages: 989-994, Article No: e107116, Year: 2019. The article elaborates Supporting the lifestyle with health promotion has been the issue mentioned by international health organizations. Medical technology has been promoted, while the problem of chronic diseases still could not be broken through. To have healthy body and mind, healthy lifestyles should be first practiced. The exact practice of health promotion would reduce the occurrence of chronic diseases as well as health care expenses for diseases. It is therefore worth of deep research on proper health literacy for the exact practice of more positive health behaviors.

Multiple factors such as the increase of ages, long-term burden, change of intervertebral disc structure and the denaturation of nucleus pulposus are all main causes of the frequent occurrence of elder protrusion of lumbar intervertebral disc. Currently, posterior decompression and fenestration, removal of nucleus pulposus and posterior lumbar intervertebral fusion in combination with pedicle screw fixation system treatment is relatively more clinically, and the technologies are relatively mature. Since the operation risk on elder patients with protrusion of lumbar intervertebral disc in combination with fracture of lumbar vertebra is high, the stability of

vertebrae is low, the insertion of internal fixations is the necessary testify as well as the condition of high occurrence rate of complications (WU et al. 2019). Therefore, the clinical researches of treating elder protrusion of lumbar intervertebral disc and fracture of lumbar vertebra by posterior lumbar intervertebral fusion in combination with interarticular screw sighting device was carried out in our hospital, and it received a relatively good result (Tokuhashi et al. 2010).

II Subjects and Methods

Patients. A total of 68 elderly patients that were diagnosed with lumbar disc herniation combined lumbar fractures in our hospital from April 2012 to April 2014 were enrolled in our study as observation group. The inclusion criteria include: patients who have the history of low back and legs pain and trauma and received conventional L-spine AP & LAT X ray examination, over flexion-extension position X ray examination, lumbosacral portion and hip MRI examination, lower limb MRI examination, and EMG. Imaging results showed: changed intervertebral disc signal combined with lowered interval space height, anterior spinal compression, increased vertebral end plate angle, increased displacement of vertebral body and vertebral fracture line. The exclusion criteria include: patients with severe heart-liver-renal dysfunction, the mentally disordered or patients with coagulation system diseases. Of all 68 patients, there were 47 males and 21 females; ranging from 66-78 years old, on average (69.5 ± 5.2) years; course of disease ranging from 5 d-16 y, median time of (3.5 ± 0.3) y; 22 cases combined with compression fracture in L4-5 segment, 18 cases combined with flexion distraction fracture in L5-S1 segment, 17 cases combined with burst fracture in both L4-5 segment and L5-S1 segment, and 11 cases combined with fracture dislocation in L3-4 segment.

In the meanwhile, a total of 53 elderly patients that were diagnosed with lumbar disc herniation combined lumbar fractures in our hospital from April 2010 to April 2012 were enrolled in our study as control group. The clinical manifestation and imaging features of all patients were consistent with the diagnostic criteria. There was no significant difference in gender, age, course of disease and type of lesion between the two groups ($P > 0.05$). The Diagram of sighting device operation is shown as Figure 1. The L4-5 intervertebral space narrowed is shown as Figure 2. The translaminar facet screw fixation under the guidance of sighting device is shown as Figure 3 (Kus and Eroglu 2015).



Figure 1. Diagram of sighting



Figure 2. The L4-5 intervertebral



Figure 3. The translaminar facet

Posterior lumbar intervertebral fusion combined with translaminar facet screw was performed to aim device on patients in observation group. The patients were maintained in prone position under general anesthesia, the site of lesion was determined and a longitudinal incision was made, and stripped the erector spinae with lesion or the erector spinae in the side with radiculopathy symptom. The spinous process was lifted to see abnormal intervertebral activity, and the laminae interval space and the narrow lateral recess was enlarged, and followed by

stripping of nucleus pulposus. 2 cm small incision was made in posterior crista iliaca to take out the bone and size of rice grain was trimmed to implant into deep intervertebral space. Before operation, MRI was conducted to precisely measure the length of translaminar facet screw, the thickness, outer oblique angle and downward inclination of vertebral plate for reference (Yu et al. 2019). Under the guidance of C-arm X-ray machine, the positioning rod of the aiming device was inserted into the intersection point of the middle line of bilateral transverse process of the lower vertebra in lesion segment and the lateral margin of the superior facet. The angle of pilot sleeve was determined according to the size of the outer angle of the vertebral plate, inserted through the skin to 1/3 of the middle upper horizontal line of spinous process base (Aroune et al. 2017).

Transforaminal lumbar interbody fusion combined conventional pedicle screw internal fixation was performed on patients in control group. The operations of transformational lumbar interbody fusion referred to above. The pedicle screw system was used to enlarge the intervertebral space, and the cartilage plates in endplate was completely stripped away. Then the broken bones and cancellous bone was implanted into the front intervertebral space, the tricortical iliac crest blocks was implanted into the back intervertebral space, the margin was 5mm lower than the vertebra posterior border, compressed and fixed the pedicle screw system. The electric coagulation and compression hemostasis was made, rinsed thoroughly by normal saline and implanted into drainage tube and sutured wounds in turn.

Postoperative treatment. It involves treatments of conventional anti-infection, lumbar fixation, analgesia and prevention of lower limb vein thrombosis. Moreover, early exercise in bed, and drainage tube can be pulled out around 48 h. Also, bed activity was performed with lumbar protective belt around 4 weeks, and trunk extensors exercise and abdominal muscle exercise was recommended after 8 weeks (Aepli et al. 2009).

Observation index and evaluation criteria. Difference of incision length, operation time, operative blood loss, amount of incision drainage and hospitalization time were compared and analyzed. Difference of visual analogue scale (VAS), height of intervertebral space and screw position evaluation were compared and analyzed. Difference of operative complication (including wound infection, skin necrosis, cerebrospinal fluid leaks, and functional deterioration of tail nerve or lower limb nerve root) were compared and analyzed. Difference of the follow up intervertebral fusion, vertebral stability effect and the improvement rate of JOA low back pain scoring system (The symptom, signs, daily activities, and bladder function were evaluated) were compared and analyzed, the improvement rate = (the last time JOA score - preoperative JOA score) / (29-preoperative JOA score) × 100%. Statistical method. SPSS 17.0 statistical software package were adopted, measurement data were shown by

standard deviation ± mean ($\bar{x} \pm s$), t test was used for group comparison; measurement data were expressed by [n (%)], chi-square test was adopted for group comparison, P < 0.05 means the comparison difference was statistically significant.

III Results

The incision length, operation time, operative blood, amount of incision drainage, hospitalization time of patients was compared in two groups, difference was not statistically significant (P > 0.05) (table 1).

Table 1. Comparison of the operative conditions of patients in two groups

Group	Incision length (cm)	Operation time (min)	Operative blood loss (ml)	Amount of incision drainage (ml)	Hospitalization time (d)
Observation	4.3 ± 0.5	80.7 ± 10.6	280.8 ± 30.4	230.4 ± 56.7	8.5 ± 1.3
Control	4.2 ± 0.8	78.2 ± 11.4	273.6 ± 25.7	215.3 ± 44.2	8.3 ± 1.1

t	0.792	0.253	0.107	0.925	0.309
P	0.353	0.925	0.426	0.458	0.984

The VAS score of patients in observation group is obviously lower than that in control group, difference was not statistically significant ($P > 0.05$), the height of intervertebral space of the two groups were significantly increased after operation, the follow up time of the two groups was about 12 months, the height of intervertebral space was decreased after operation, the height of intervertebral space after operation and follow up in observation group was significantly higher than that in control group, the difference was statistically significant ($P < 0.05$). I type ratio of screw position in observation group after operation was significantly higher than that in control group, the difference was statistically significant ($P < 0.05$) (see table 2).

Table 2. Comparison of VAS score, height of intervertebral space and screw position evaluation of patients in two groups

Group	Case	VAS score	Height Of intervertebral Space (mm)			I type ratio of Screw Position (%)
			Pre-operation	Post-operation	Follow-up	
Observation	68	2.1 ± 0.3	6.7 ± 0.4	12.3 ± 1.2	11.5 ± 2.2	61(89.7)
Control	53	2.8 ± 0.2	6.8 ± 0.5	10.5 ± 1.3	9.2 ± 1.6	40(75.5)
t (χ^2)		1.926	0.526	2.351	3.024	2.956
P		0.037	0.328	0.033	0.021	0.025

Comparison of operative complication, operative effect and improvement rate of JOA score of patients in two groups.

The incidence of operative complication in observation group was significantly lower than that in the control group, and the operative effects of 6 months follow up and 12 months follow up were significantly higher than that in the control group, the difference was statistically significant ($P < 0.05$). Comparing JOA score of patients in two groups before operation, the difference was not statistically significant ($P > 0.05$), the follow up score of patients in two groups was significantly increased, and the increasing level of the observation group was more obvious than that of the control group, the improvement rate of the observation group was significantly higher than that of the control group, the difference was statistically significant ($P < 0.05$) (See table 3).

Table 3. Comparison of operative complication, operative effect and improvement rate of JOA score of patients in two groups

Group	Cases	Complication (%)	Intervertebral fusion and vertebral Stability (%)		JOA score		
			Follow up 6 months	12 months	Pre-operation	Follow up	Improvement rate (%)
Observation	68	5 (7.4)	61 (89.7)	57 (83.8)	12.4 ± 2.3	26.5 ± 2.8	81.3 ± 10.2
Control	53	6 (11.3)	41 (77.4)	36 (67.9)	12.8 ± 1.6	20.3 ± 2.1	73.6 ± 14.3
t (χ^2)		3.625	4.025	4.523	0.326	3.265	3.845
P		0.014	< 0.001	< 0.001	0.854	0.021	0.012

IV Discussion

According to related research, trans laminar facet screw aiming device has stable elasticity, so its fixation

strength is relatively weak. In our study, we have used translaminar facet screw aiming device to treat the aged patients with disc herniation combined fracture and the results showed that the proportion of screw position I of observation group was significantly higher than that of control group. The occurrence of complications such as spondylolysis, dislocation, fracture of the internal fixator, fracture nonunion and disc herniation recurrence of the observation group was significantly lower than that of the control group; and during the 6-month and 12-month follow-up, the interbody fusion and vertebral stability of the observation group were significantly higher than those of the control group. The results of our study indicated that the fixation effect of translaminar facet screw aiming device may be superior to pedicle screw fixation. Therefore, to fully understand the indications and contraindications of the surgery, and screen the risk factors that may reduce the surgical effects are also the key for clinical treatment.

V Conclusions

Intervertebral bone fusion combined with translaminar facet screw aiming device in the treatment of elderly patients with lumbar intervertebral disc herniation combined lumbar fracture can further increase the stability of the vertebral body, improve the success rate of bone graft fusion and fracture reduction, improve the clinical effects and reduce the complications.

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