ORIGINAL RESEARCH

Spinal Fixed-point Rotating Reduction for Treatment of Facet Joint Disorders

Jingjing Zheng, MM; Chen Duan, MS; Chaoyang Ma, MS

ABSTRACT

Context • Facet joint disorder is a series of clinical syndromes that lumbar trauma or degenerative disease can cause, and it can result in lumbar pain and restricted movement. Despite use of conventional Western and traditional Chinese treatments, patients can still experience many clinical symptoms, with no effective improvements in lumbar-spine movement or quality of life.

Objective • The study intended to investigate the effects of spinal, fixed-point, rotating reduction on the pain levels and daily living abilities of patients with facet joint disorders.

Design • The research team performed a prospective, randomized controlled study.

Setting • The study took place at Wuhan Central Hospital, Affiliated to Tongji Medical College, at Huazhong University of Science and Technology in Wuhan, China.

Participants • Participants were 88 patients with facet joint disorders who had been admitted to the hospital between June 2021 and August 2022.

Intervention • The research team randomly divided participants into two groups, with 44 participants in each group, using the numerical table method: (1) the intervention group, who received treatment using the spinal, fixed-point, rotating reduction method, and (2) the control group, treated who received treatment using conventional tui-na, acupuncture, and traction.

Outcome Measures • The research team measured changes: (1) in pain, (2) in lumbar mobility, (3) in lumbar-spine function, and (4) in daily living abilities.

Results • In the comparisons between the groups at baseline, no significant differences existed: (1) in pain levels (P = .656); (2) in forward flexion (P = .982), extension (P = .887), lateral flexion (P = .408), or rotation (P = .888); (3) in the scores for clinical symptoms (P = .982), subjective symptoms (P = .887), or limitations in daily activities (P = .408); or (4) in the scores for daily living abilities (P = .427). In the comparisons between the groups at two weeks postintervention, the intervention group's: (1) pain levels were significantly lower than those of the control group (P < .001); (2) forward flexion, extension, lateral flexion, and rotation were significantly higher than those of the control group (all P < .001); (3) scores for clinical symptoms, subjective symptoms, and limitations in daily activities were significantly better than those of the control group (all P < .001); and (4) scores for daily living abilities were subjective higher than those of the control group (P < .001).

Conclusion • Spinal, fixed-point, rotating reduction can significantly relieve the pain of patients with facet joint disorders restore their lumbar spine mobility, improve their lumbar spine function, increase their ADL abilities, and facilitate patients' recovery. Practitioners can promote it in clinical practice. (*Altern Ther Health Med.* 2023;29(7):316-321).

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The lumbar spine's facet joints are bursal joints, also known as the posterior lumbar joints. They form a composite joint with the intervertebral discs and play a key role in maintaining a stable spine. Lumbar-spine facet joint disorder is a series of clinical syndromes that lumbar trauma or degenerative disease can cause, leading to misalignment of the synovial joint of the posterior lumbar and synovial impaction; this can result in lumbar pain and restricted movement, also known as posterior lumbar synovial impaction.[1,2,3]

The occurrence of facet joint disorder is closely related to long-term, lumbar, weight-bearing strain and poor postural habits of the lumbar region. According to Musso et al and Wang et al, the lumbar pain that facet joint disorder can cause accounts for 57%-65% of chronic lumbar pain and has a serious impact on the normal life of patients.[4,5]

Pathological Mechanism

The main pathological mechanism of facet joint disorder is a sudden twisting of the joints, such as from a movement that an external force causes, producing flashes of pain. The lumbar spine's facet joints also can change due to the degeneration of the intervertebral discs. In either case, the pressure balance between the inner and outer side is disrupted, resulting in negative pressure in the joint cavity. This can cause the joint capsule, which in a relaxed state is wrapped around the synovial joint, to be sucked into the joint cavity.[6]

The synovial membrane attached to the interior of the lumbar facet joint contains a large number of capillaries and nerve fibers.[20] As a result, it's quite sensitive to both inflammatory and mechanical stimuli. When torsional trauma and excessive weight-bearing occurs in the lumbar region, they can cause mechanical instability of the lumbar spine, stretch the lumbar spine's facet joints, and change the facet joint space, allowing negative pressure to form in the lumen.

The synovial membrane becomes embedded between the facet joints under the effects of the negative pressure, inducing subluxation or dislocation of the lumbar spine's facet joints. Patients can experience reflex muscle spasm and pain in the lumbar region. Congestion and edema, inflammatory exudate, and adhesions in the surrounding soft tissues accompany facet joint disorder. Compression of the sympathetic and spinal nerve roots by the surrounding congested and edematous soft tissues can further aggravate the pain and result in further restriction of the lumbar spine's movement.[21]

Western Medicine

At present, many clinical treatments for facet joint disorder are available in Western medicine, including nonsteroidal anti-inflammatory and analgesic drugs and local injections of drugs using closed drug delivery systems in severe cases.[3]

Western conservative treatment is currently the mainstay for the condition, including bed rest, pain relieving and antispasmodic medications to relieve pain, and methods that can release lumbar muscle spasm, reduce intervertebral joint pressure, and promote withdrawal of synovial membranes embedded in facet joints. A combination of physiotherapy and spinal-board methods can supplement the prior methods.

Changfei found that chiropractic manipulation combined with other adjunctive methods could be effective in reducing the Japanese Orthopedic Association's (JOA's) score that evaluates lumbar-spine function in patients with facet joint disorder.[27]

However, patients can still experience many clinical symptoms, with no effective improvements in lumbar-spine movement or quality of life.[22] Therefore, researchers need to actively explore other treatments.

Traditional Chinese Medicine

Traditional Chinese medicine (TCM) often uses an external application of Chinese herbs, massage, acupuncture, cupping, and other treatments, all of which can alleviate the clinical symptoms and reduce patients' pain levels.[7,8] Zhu and Jiang found that effective interventions can effectively reduce the pain levels of patients with facet joint disorder.[26]

Based on the clinical symptoms of facet joint disorder, Chinese medicine classifies it as lumbago or tendons out of grooves, bones misaligned. TCM practitioners believe that the main pathogenesis of facet joint disorder is poor flow of Qi and blood and that lack of circulation causes pain. Therefore, they often base clinical treatment on the principle of circulation as smoothness.[22]

The basic cause of facet joint disorder is the blockage of the lumbar meridians due to a deficiency of positive qi, external evil, or injury from falls and puffs. When the spine, bones, and joints are subjected to direct or indirect external forces, the normal anatomical position of the joints is easily altered due to the inability of the relaxed tendons and veins to effectively stabilize the joints; this results in joint misalignment and synovial impaction followed by symptoms of facet joint disorders.[23]

In the book *The Golden Guide to Medical Practice - The Essentials of Bone Setting*, points out that "the bone seam may be wrongly opened due to a fall or a flicker, and the qi and blood may be stagnant. The patient can be cured if he or she moves the congestion to disperse the swelling of the stasis."

Chaoyang Ma proposed that manipulation is the first of TCM's four major methods of treating orthopedic injuries. It's the main method of treating facet joint disorder. The lumbar oblique plate method is the method often used clinically to release facet intervertebral joint disorders and synovial impingement and extrusion.

Practitioners mainly use it to passively rotate the intervertebral joints in the lumbar region to increase the intervertebral space and release synovial impaction and compression and to correct the anatomical position of the facet joints.

However, clinical findings suggest that this technique is flawed.[24] Du Shunjie and Song found that excessive rotational manipulation can potentially be harmful to the lumbar synovial capsule and can cause increased back pain for some patients.[25]

Spinal, Fixed-point, Rotation

Spinal, fixed-point, rotating reduction, also known as Feng's spinal manipulation, is rooted in a combination of modern Western medicine's understanding of anatomy, pathophysiology, and biomechanics and TCM's bone-setting expertise.[9] Li and Han and Zhao and Tian found that it can effectively correct misaligned synovial joints, relieve clinical symptoms, and reduce pain for patients with facet joint disorder.[10,11]

Under the stimulation of the technique, the abdominal muscles contract protectively, and the lumbar vertebrae reflexively back up in an autonomous rotation process, and the passive pulling of the lumbar-muscle fibers on the joint capsule can instantly release any impaction.

The use of a steady, accurate, and gentle technique can induce rapid stretching of the extruded synovial membrane, prevent synovial adhesions while slipping the joint, restore the anatomical position of the facet joints, and rapidly relieve the acute symptoms, thus improving a patient's ability to perform the activities of daily life.

However, little clinical research has occurred on the use of spinal, fixed-point, rotating reduction in the treatment of facet joint disorder.

Current Study

Yang and Yang pointed out that effective research measures could effectively restore lumbar spine mobility for patients with facet joint disorder.[22]

The current study intended to investigate the effects of spinal, fixed-point, rotating reduction on the pain levels and daily living abilities of patients with facet joint disorder.

METHODS

The research team performed a prospective, randomized controlled study, which took place at Wuhan Central Hospital, Affiliated to Tongji Medical College, at Huazhong University of Science and Technology in Wuhan, China. Potential participants were patients with facet joint disorder who had been admitted to the hospital between June 2021 and August 2022.

The study included potential participants if they: (1) met the diagnostic criteria for facet joint disorder and (2) had good compliance.

The study excluded potential participants if they had: (1) had an electrocardiogram related to precordial pain and palpitations; (2) an organic cardiothoracic pathology; (3) gastrointestinal disease; (4) hepatobiliary disease; (5) ankylosing spondylitis, spinal stenosis, intravertebral tumors, tuberculosis, osteoporosis, or osteoarthritis; or (6) broken or ulcerated skin or skin disease.

Participants signed an informed consent form. This study's protocol met the relevant requirements of the World Medical Association's Declaration of Helsinki.[12]

Procedures

Diagnostic criteria. No uniform criteria exists for the diagnosis of facet joint disorder, and physicians mainly base a clinical diagnosis on symptoms rather than on imaging results and according to publications and literature such as *Comparative Imaging of Lumbar Spine Disorders*[13] and *Clinical Guidelines - Orthopedic Division*.[14,15]

The criteria for facet joint disorder include: (1) a history of lumbar injury, frequent bending and heavy lifting, or twisting of the lumbar region before onset; (2) compensatory concavity or scoliosis of the spine; and (3) acute attacks of sustained, severe, lumbar pain, with chronic attacks that can present with lumbar soreness and limitations in forward flexion and in increased pain when the lumbar spine is in posterior extension.

In addition, the site of the lumbar pain must be consistent with the side of the lumbar facet joint disorder: (1) with no pressure pain on the healthy side, (2) with lumbar muscle spasms and stiffness on the affected side that radiate to the sacral region and thighs and buttocks after pressure, (3) with no pain over the knees, (4) with no sign of nerve deficiency in the lower limbs, and (5) with a negative straight-leg-raise test.

With respect to imaging: (1) a central ray (CR) of the lumbar spine must show no obvious facet joint disorder in most joints; (2) X-rays must show blurring of the articular surfaces of some facet joints, narrowing of the gaps, the partial presence of scoliosis, and a reduction or disappearance of the physiological, anterior convexity of the lumbar spine; and (3) a computed tomography (CT) scan of the lumbar spine must show hyperplasia of the articular processes, widening of the gaps, poor alignment, degeneration of the articular processes, subchondral sclerosis, and intra-articular fragmentation.

Intervention. The research team randomly divided participants into two groups, using the numerical table method: (1) the intervention group, who received treatment using the spinal, fixed-point, rotating reduction method, and (2) the control group, who received treatment using conventional tui-na, acupuncture, and traction.

Preparatory techniques. The techniques should be gentle and comfortable for the patient, and no heavy techniques, such as pointing, pushing, and percussion, should occur. The patient lies in a prone position, with the lumbar region relaxed. The therapist: (1) first strokes a large surface area in the patient's posterior lumbar region, from the top down to the buttock region, (2) follows those strokes with several strokes of kneading, kneading, rubbing and friction, and (3) ends with stroking.

Outcome measures. The research team measured changes: (1) in pain, (2) in lumbar mobility, (3) in lumbar-spine function, and (4) in daily living abilities.

Intervention

Control group. The research team assessed each participant using the conventional lumbar ramp method, in which the patient lies in a lateral position with the affected limb underneath the other limb and straight. The affected limb would be on top and the hip and knee would be flexed over the opposite limb.

After the operation, the therapist would stand behind the patient and place one hand or forearm at the posterior outer edge of the patient's iliac bone to push the hip forward with force, and place his or her other hand or forearm above the patient's front shoulder to pull the shoulder back. When the procedure has twisted the patient's waist to the maximum degree, the therapist applies a sudden flash of power, at which time he or she can hear or feel a crisp click in the waist, indicating successful implementation of the technique.

Intervention group. In the spinal, fixed-point, rotating reduction method, the therapist: (1) before the operation, should clarify the orientation of the spinous process and the degree of displacement and should divert the patient's attention using verbal communications during the whole operation; and (2) when the patients' spine is in a state of instability, should use leverage at a fulcrum as the main points of manipulation, and when the patient bends forward and rotates his or her spine, the spinous process of the affected vertebra should be just above the therapist's thumb.

The therapist: (1) then uses the thumb's position for the spine's manipulation and repositioning using the angle of the patient's forward bending, lateral bending, and rotation of the spine; (2) should inform the patient of any forward flexion or scoliosis of the spine; and (3) should hold the patient's upper limb or shoulder with his or her other hand and forcefully assist the patient to actively rotate.

After the therapist prepares the spinal rotation position, he or she performs the technique with a steady, precise, and light touch, applying the combined force of both hands in a coordinated manner. If the angle of rotation of the spine to one side is too great, the therapist should stop the manipulation and turn to the other side, by pushing either on the upper or lower angle of the same spinous process.

During the repositioning process, the therapist: (1) in the case of two cone displacements, should push on the other cone; (2) in the case of single-cone displacements, should try to push on the upper or lower cone, but shouldn't use force and should allow the dislocated cone to return to its own position; and (3) should identify the spine to be corrected and should hear a click at the moment of repositioning; if the sound is crisp and single, the result will be better.

The therapist should perform the above technique once a day for 7 days.

Outcome Measures

Pain. The research team evaluated participants' pain using a visual analogue scale (VAS),[16] at baseline and immediately and at 2 weeks postintervention. The scores ranged from zero to 10, with higher scores indicating less pain.

Lumbar spine mobility.[17] The research team checked participants' lumbar spine mobility at baseline and at 2 weeks postintervention by asking the patient to perform (1) forward flexion—bending the waist and trying to touch the ground with the hands, with normal forward flexion being up to 90°; (2) extension—bending the waist as far back as possible to check lumbar extension, with normal extension being approximately 35°; (3) lateral flexion—bending to the left and right side, with normal mobility being approximately 30° on each side; and (4) rotation—rotation of the lumbar region to the left and right side, with normal rotation being approximately 45° on each side.

Lumbar spine function. The research team used the JOA score to assess function at baseline and at 2 weeks postintervention .[18,] The JOA's three subscales assess clinical symptoms, for 6 points; subjective symptoms, for 9 points; and limitations in daily activities, for 14 points. The possible scores for each item range from zero to 29, and the higher the score, the better the patient's lumbar spine function.

Ability to perform activities of daily living. The research team used the activities of daily living (ADL)[19] scale to assess that ability at baseline and at 2 weeks postintervention. ADL can effectively evaluate the most basic social functions for people with chronic diseases and clinicians widely use it in the treatment of chronic diseases.[28] Xue et al pointed out that effective interventions could improve ADL for patients with facet joint disorder.[29]

The scale includes 10 items, such as walking up and down stairs, bathing, and eating, with a possible score for each item of 10 and with higher scores indicating a higher ability to perform activities of daily living.

Statistical Analysis

The research team analyzed the data using SPSS 21.0 software . The team: (1) expressed measurement data—pain level, lumbar mobility, lumbar-spine function, and daily living ability as means ± standard deviations (SDs) and used the *t* test to compare the groups, and (2) expressed counting data as numbers and percentages (%) and used the chi-square (χ^2) test to compare the groups. $P < .05$ indicated that differences were statistically significant.

RESULTS

Participants

Table 1 shows the demographic and clinical characteristics of the two groups. The research team included and analyzed the data of 88 participants, 44 in each group. No significant differences existed between the groups at baseline ($P > .05$).

The intervention group included 26 males (59.09%) and 18 females (40.91%), ranging in age from 23 to 46 years and having an average age of 32.32 ± 9.09 years. The range of that group's course of disease was 20 to 64 h, with a mean course of 42.27 ± 4.35 h. L3-4 were the affected segments of 19 participants (43.18%), and L4-5 were the affected segments of 25 participants (56.82%).

The control group included 25 males (56.82%) and 19 females (43.18%) ranging in age from 23 to 45 years and

Table 1. Participants' Demographic and Clinical Characteristics at Baseline

Characteristics	Intervention Group n = 44 n (%) Mean ± SD	Control Group n = 44 n (%) Mean ± SD	t/z	*P* value
Gender			0.304	.761
Male	26 (59.09)	25 (56.82)		
Female	18 (40.91)	19 (43.18)		
Age, y			0.170	.865
Range	23-46	23-45		
Mean	32.32 ± 9.09	31.98 ± 9.65		
Disease Duration, hrs			0.086	.932
Range	20-64	20-64		
Mean	42.27 ± 4.35	42.19 ± 4.39		
Lumbar Segmentation			0.430	.667
L3-L4	19 (43.18)	18 (40.91)		
L4-L5	25 (56.82)	26 (59.09)		

having a mean age of 31.98 ± 9.65 years. The range of that group's course of disease was 20 to 64 h, with a mean course of 42.19 ± 4.39 h. L3-4 were the affected segments of 18 participants (40.91%), and L4-5 were the affected segments of 26 participants (59.09%).

Pain Levels

Table 2 shows that no significant differences existed between the groups in pain levels at baseline ($P = .656$). Immediately postintervention and at 2 weeks postintervention, the intervention group's mean pain levels, at 1.03 ± 0.31 and 0.82 ± 0.21, respectively, were significantly lower than those of the control group, at 1.35 ± 0.39 and 1.23 ± 0.19, respectively (both $P < .001$). These results indicate that the spinal, fixed-point, rotating reduction was significantly effective in reducing pain levels in the intervention group.

Lumbar Mobility

Table 3 shows that no significant differences existed between the groups in the scores for forward flexion ($P = .982$), extension ($P = .887$), lateral flexion ($P = .408$), or rotation ($P = .888$) at baseline. At 2 weeks postintervention, the intervention group's scores for forward flexion, extension, lateral flexion, and rotation, at 86.19 ± 7.12, 33.89 ± 1.32, 30.97 ± 1.27, and 43.22 ± 3.36, respectively, were significantly higher than those of the control group, at 71.29 ± 7.09, 28.91 ± 1.26, 26.97 ± 1.67, and 38.75 ± 3.76, respectively (all $P < .001$). These findings suggest that the treatment was significantly effective in improving the intervention group's lumbar mobility, which is particularly relevant given the high prevalence of lumbar-mobility issues in patients with facet joint disorders and their potential impact on quality of life.

Lumbar Spine Function

Table 4 shows that no significant differences existed between the groups at baseline in the scores for clinical symptoms ($P = .982$), subjective symptoms ($P = .887$), or restriction of daily activities ($P = .408$). At 2 weeks postintervention, the intervention group's scores for clinical symptoms, at 86.19 ± 7.12; subjective symptoms, at 33.89 ± 1.32; and restriction of daily activities, 30.97 ± 1.27, were significantly better than those pf the control group, at 71.29 ± 7.09, 28.91 ± 1.26, and 26.97 ± 1.67, respectively (all $P < .001$).

Activities of Daily Living

Table 5 shows that no significant differences existed between the groups at baseline in the ability to perform activities of daily living

Table 2. Comparison of Pain Levels Between the Intervention and Control Groups

Time	Intervention Group n = 44 Mean ± SD	Control Group n = 44 Mean ± SD	*t*	*P* value
Baseline	6.03 ±1.03	5.93 ± 1.07	0.447	.656
Immediately postintervention	1.03 ± 0.31	1.35 ± 0.39	-4.261	<.001[a]
2 weeks postintervention	0.82 ± 0.21	1.23 ± 0.19	-9.603	<.001[a]

[a]$P < .001$, indicating the intervention group's pain levels were significantly lower than those of the control group immediately and at two weeks postintervention

Table 3. Comparison of Lumbar Mobility Between the Intervention and Control Groups

Indicators	Time	Intervention Group n = 44 Mean ± SD	Control Group n = 44 Mean ± SD	*t*	*P* value
Forward Flexion	Baseline	45.38 ± 6.19	45.41 ± 6.87	-0.022	.982
	2 weeks postintervention	86.19 ± 7.12	71.29 ± 7.09	0.836	<.001[a]
Extension	Baseline	12.37 ± 1.28	12.41 ± 1.34	0.143	.887
	2 weeks postintervention	33.89 ± 1.32	28.91 ± 1.26	18.102	<.001[a]
Lateral Flexion	Baseline	18.09 ± 0.76	18.23 ± 0.82	-0.831	.408
	2 weeks postintervention	30.97 ± 1.27	26.97 ± 1.67	12.647	<.001[a]
Rotation	Baseline	20.97 ± 3.28	21.07 ± 3.37	-0.141	.888
	2 weeks postintervention	43.22 ± 3.36	38.75 ± 3.76	5.881	<[a].001[a]

[a]$P < .001$, indicating the intervention group's scores for forward flexion, extension, lateral flexion, and rotation were significantly higher than those of the control group at two weeks postintervention

Table 4. Comparison of Lumbar Spine Function Between the Intervention and Control Groups

Indicators	Time	Intervention Group n = 44 Mean ± SD	Control Group n = 44 Mean ± SD	*t*	*P* value
Clinical Symptoms	Baseline	45.38 ± 6.19	45.41 ± 6.87	-0.022	.982
	2 weeks postintervention	86.19 ± 7.12	71.29 ± 7.09	9.836	<.001[a]
Subjective Symptoms	Baseline	12.37 ± 1.28	12.41 ± 1.34	-0.143	.887
	2 weeks postintervention	33.89 ± 1.32	28.91 ± 1.26	18.102	<.001[a]
Restriction in Daily Activities	Baseline	18.09 ± 0.76	18.23 ± 0.82	-0.831	.408
	2 weeks postintervention	30.97 ± 1.27	26.97 ± 1.67	12.647	<.001[a]

[a]$P < .001$, indicating the intervention group's clinical symptoms, subjective symptoms, and restrictions in daily activities were significantly better than those of the control group at two weeks postintervention

Table 5. Comparison of Daily Living Abilities Between the Intervention and Control Groups

Time	Intervention Group n = 44 Mean ± SD	Control Group n = 44 Mean ± SD	t	*P* value
Baseline	43.97 ± 3.97	44.65 ± 4.02	-0.798	.427
2 weeks postintervention	73.56 ± 4.22	65.08 ± 4.53	9.086	<.001[a]

[a]$P < .001$, indicating the intervention group's daily living abilities were significantly better than those of the control group at two weeks postintervention

($P = .427$). At 2 weeks postintervention, the intervention group's score for daily living ability, at 73.56 ± 4.22, was significantly better than that of the control group, at 65.08 ± 4.53 ($P < .001$). This difference suggests that the treatment had a positive impact on the intervention group's ability to perform daily activities, highlighting the potential benefits of the treatment.

DISCUSSION

The current study used spinal, fixed-point, rotating reduction, based on the mechanism of facet joint disorder, to release synovial impaction and compression and to adjust the facet-joint-position relationship, thus relieving the clinical symptoms of patients. The study found that the intervention group's pain level was significantly lower than that of the control group immediately postintervention and 2 weeks postintervention. This suggests that spinal, fixed-point, rotating reduction can significantly relieve the immediate pain of patients with facet joint disorder.

The current study found that at 2 weeks postintervention, the intervention group's forward flexion, extension, lateral flexion, and rotation were significantly higher than those of the control group, suggesting that spinal, fixed-point, rotating reduction can effectively increase the amplitude of forward flexion, extension, lateral flexion and rotation for patients with facet joint disorder and induce an increase in lumbar mobility. This may be due to the fact that spinal fixed-point rotating reduction uses appropriate forward-flexion, lateral-bending, and rotation angles so that the force acts on the disordered joints of the involved segments, adjusting the involved joints and decreasing the joint disorder, thus restoring the lumbar joint mobility.

The current study showed that at 2 weeks postintervention, the intervention group's scores for clinical symptoms, subjective symptoms, and limitation on daily activities were significantly better than those of the control group, suggesting that spinal, fixed-point rotating reduction can significantly improve the function of the lumbar spine for patients with facet joint disorder.

The current study showed that at 2 weeks postintervention, the intervention group had higher ADL scores than the control group did, suggesting that spinal, fixed-point, rotating reduction can significantly improve the scores for ADL of patients with facet joint disorder. This may be attributed to the treatment's method of implementation in which the therapist talks to the patient to divert his or her attention and to induce relaxation of the lumbar muscles.

The current study had some limitations. The sample size was small; the study used no age groupings; and the follow-up period was short. An inadequate sample size and a short follow-up period can lead to insufficiently reliable conclusions. The current research team plans to perform a study in multiple centers to expand the sample size and also to prolong the follow-up period to one year to further confirm the results of the current study.

CONCLUSIONS

Spinal, fixed-point, rotating reduction can significantly relieve the pain of patients with facet joint disorders, restore their lumbar spine mobility, improve their lumbar spine function, increase their ADL abilities, and facilitate patients' recovery. Practitioners can promote it in clinical practice.

AUTHORS' DISCLOSURE STATEMENT

The authors declare there is no conflict of interest.

AUTHOR CONTRIBUTIONS

Jingjing Zheng and Chen Duan contributed equally to this paper and should be regarded as co-first authors.

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