Original Article

Efficacy and safety of unilateral biportal endoscopic discectomy and conventional endoscopic discectomy in the treatment of lumbar disc herniation: a systematic review and meta-analysis

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Background: Unilateral double-port endoscopic (UBE) discectomy is a newly invented surgical procedure for the treatment of lumbar disc herniation (LDH). As it has been on the market for a relatively short period of time, the lack of systematic analysis of the clinical efficacy and safety of the treatment of LDH is unclear. In this study, we compare randomised controlled trials to assess the clinical efficacy and safety of UBE and conventional endoscopic discectomy for LDH.

Methods: The Chinese National Knowledge Infrastructure, Wanfang, PubMed, Embase, Cochrane library, and Chinese Biomedical databases were searched (from database inception to October 2022). The quality of included studies was assessed according to the Cochrane Risk Manual. The intervention of the UBE group was UBE discectomy, and the control measure was conventional endoscopic discectomy. The outcome indicators included hospital stay, the visual analogue score (VAS), intraoperative bleeding, the Oswestry dysfunction index (ODI), and complications. The data were analyzed using RevMan 5.4.

Results: In total, 7 studies were included. Intraoperative bleeding was higher in the control group than in the UBE group (MD =−0.07; 95% confidence interval (CI): −0.21 to 0.08; P=0.14). The improvement of ODI score in the UBE group was significantly better (MD =0.13, 95% CI: −0.06 to 0.32; P=0.17). There was no statistical heterogeneity in terms of postoperative complications (I^2=0%, P=1.00). The complication rate in the UBE group was lower (MD =0; 95% CI: −0.15 to 0.15; P=1.00). Postoperative VAS improvement in UBE group was significantly better (MD =−0.12; 95% CI: −0.27 to 0.03; P=0.11). The length of hospital stay in UBE group was shorter (MD =−2.04; 95% CI: −2.23 to −1.84; P<0.05). The *t* value of hospitalization length, VAS, Intraoperative bleeding, ODI and complicationswere 0.000–0.081, v was 20–26, all P>0.05, suggesting that this conclusion was stable.

Conclusions: Patients in the UBE group spent less time in the hospital than the control group, and UBE group patients also woke up earlier than the control group. Therefore, UBE discectomy has certain reference value and can be popularized in clinic.

Keywords: Unilateral biportal endoscopic (UBE) discectomy; lumbar disc herniation (LDH); pain visual analog score; Oswestry dysfunction index; meta-analysis

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Introduction

Lumbar disc herniation (LDH) is a common disease in which the nucleus pulposus tissue is prolapsed due to external forces or internal degeneration, resulting in nerve root compression tracts (1). Free LDH is one of the more severe types of LDH, which mainly manifests clinically as low back pain, lower limb numbness, and difficulty walking (2). Patients with free LDH are commonly treated through minimally invasive surgery, but as the herniated nucleus pulposus tissue is free in the spinal canal, a clearly visible and precise procedure must be performed (3). The minimally invasive procedure commonly used to treat free LDH is percutaneous endoscopic lumbar discectomy, but the field of view of this procedure is relatively fixed, and the movable range of the instruments in the working channel is small, which does not allow extensive exploration in all directions in the spinal canal (4,5).

Unilateral double-port endoscopic (UBE) and conventional endoscopic discectomy have been shown to be effective in the treatment of free LDH (6). Some studies have shown that UBE has a large and flexible operating space and is easy to use, with a wide range of visualization, allowing exploration of all parts and directions of the spinal canal, which facilitates exploration and decompression of the entire spinal canal (6,7). It has also been reported in the literature that conventional endoscopic discectomy provides rapid puncture positioning, clear visualization of the dural sac, nerve roots and other important structures, and complete direct visualization of the spinal canal for decompression based on a small opening, with significant results in spinal canal decompression and the advantages of rapid recovery and few complications (8). The UBE technique is effective in the treatment of free LDH, as it has a large operating space and is flexible and convenient (9). The wide range of visualization enables the exploration of all parts and directions of the spinal canal, which helps to explore and decompress the whole spinal canal and almost achieves the effect of open microsurgery. Nevertheless, there are a few issues with it, including a small scale of research and inaccurate specific efficacy estimates (10). Conventional endoscopic discectomy has a surgical success rate of 70% to 90%, compared with a UBE success rate of 90%. UBE can significantly reduce postoperative nerve fibrosis, protect the intraspinal venous system, and reduce the incidence of postoperative spinal instability and facet joint disease. However, UBE needs to establish two working channels, namely two incisions. Muscles are more susceptible to injury in UBE surgery. The learning curve is relative long. UBE also has postoperative complications, including poor treatment efficiency, hematoma, dural tear and incomplete surgery (11,12). To better assess the clinical efficacy and safety of UBE and conventional endoscopic discectomy for LDH, a meta-analysis is needed.

Traditional endoscopic discectomy was first only applied to single-segment lumbar disc herniation. With the development of this technology, spinal surgeons gradually began to choose traditional endoscopic discectomy for some patients with double-segment or multi-segment lumbar disc herniation. According to the size of surgical trauma, the minimally invasive advantages of traditional endoscopic discectomy may be more obvious for two-level or multi-level lumbar disc herniation. In this article, we analyzed data and systematically evaluated the efficacy and safety of UBE discectomy and conventional endoscopic discectomy in the treatment of LDH to provide a reference for clinical application. We present the following article in accordance with the PRISMA reporting checklist (available at https://apm.amegroups.com/article/view/10.21037/apm-22-1364/rc).

Highlight box

Key findings

- UBE discectomy is effective in the treatment of LDH.

What is known and what is new?

- Percutaneous endoscopic lumbar discectomy The minimally invasive procedure commonly used to treat lumbar disc herniation is.
- UBE spends less time in the hospital and UBE treated patients also woke up earlier.

What is the implication, and what should change now?

- UBE discectomy has certain reference value and can be popularized in clinic.

Methods

Literature search

The CNKI, Wanfang database, PubMed, Embase, Cochrane library, and Chinese Biomedical databases were searched to retrieve articles, which had been published between the time of database inception and October 2022, on randomized controlled trials (RCTs) examining the efficacy and safety of UBE discectomy in the treatment of LDH. The Chinese search terms were "unilateral biportal endoscopic discectomy", "lumbar disc herniation", "unilateral biportal endoscopy", "lumbar degenerative disc changes," "lumbar disc prolapse", "lumbar disc herniation", etc.; the English search terms were "unilateral dual-channel spinal endoscopic surgery", "lumbar disc herniation", "unilateral dual-channel spinal endoscopy", "lumbar disc degeneration", "lumbar disc herniation", "UBE", "LDH", "lumbar disc herniation", etc.

Inclusion criteria

According to the PICOS principle, the inclusion of articles in this meta-analysis must meet the following criteria:

- ❖ P (participants): patients with LDH.
- ❖ I (interventions): minimally invasive surgery of the lumbar spine.
- ❖ C (comparisons): comparisons for the UBE group are UBE discectomy, while comparisons for the control group are conventional UBE discectomy.
- ❖ O (outcomes): pain, intraoperative bleeding, Oswestry Dysfunction Index (ODI), and visual analogue scale (VAS) of complications.
- ❖ S (study design): RCT study, including at least 3 evaluation indicators selected for this analysis, with comprehensive available data.

Exclusion criteria

Articles were excluded from the meta-analysis if they met any of the following exclusion criteria: (I) had a follow-up time <6 months, concerned a similar study published within the same period at the same institution, concerned a single-arm study without a control group, concerned a case report or a review, was a duplicate publication, the full text was unavailable, or serious complications were observed in the study subjects before or during the study; (II) included patients with a history of tuberculosis, inflammation, tumor, etc. in the lesioned segment, a history of trauma (fracture), or who had undergone surgery in the lesioned segment; and/or (III) included patients who showed degenerative changes, such as calcification, severe adhesions, lumbar instability, or hypertrophy of the ligamentum flavum, or patients who had cauda equina syndrome, or patients who had a combination of serious medical diseases in the lesioned segment.

Literature screening and data extraction

The literature was independently screened by 2 investigators using Note Express software. The investigators read the abstract and full text and examined the articles according to the inclusion and exclusion criteria. The extracted information included details of the authors, time of publication, sample size, randomization protocol, interventions, and outcome indicators, which were cross-checked one by one. In the case of a disagreement that could not be resolved, a 3rd investigator was consulted.

Quality evaluation

The quality of all included RCTs was evaluated by 2 staffs according to the Cochrane risk manual independently (Cochrane RoB 2.0) (13). The quality was divided as low, high, and some concerns according to: (I) the missing of randomization and allocation information was defined as high bias risk, the quality was defined as low; (II) the presentation of randomization and allocation information indicated low bias risk, and the quality was defined as high; (III) if neither of the above criteria were met, the quality was defined as some concerns.

Statistical analysis

Rev Man 5.4 software was used for data consolidation and statistical analysis. For binary data, relative risk ratio (RR) and 95% confidence interval (CI) were used to represent the data. For continuous data, mean difference (MD) and 95% CI were used. When I^2 was >50% and P was <0.1, we adopted a random-effects model, and when P was >0.1 and I^2 was <50%, we adopted a fixed-effect model. If it is caused by clinical factors or research methods, the *t*-test of two independent samples is used to compare the difference between the random effects model and the fixed effects model in the point estimation and interval estimation of the combination values, and to analyze the sensitivity. Heterogeneity may come from population, test method, race and other factors.

Results

Literature screening results

Based on the search strategy, 389 relevant articles were retrieved, of which, 296 duplicate articles from the databases were excluded. A full-text screening was then performed, and after the application of the inclusion and exclusion criteria, 7 articles remained and were included in

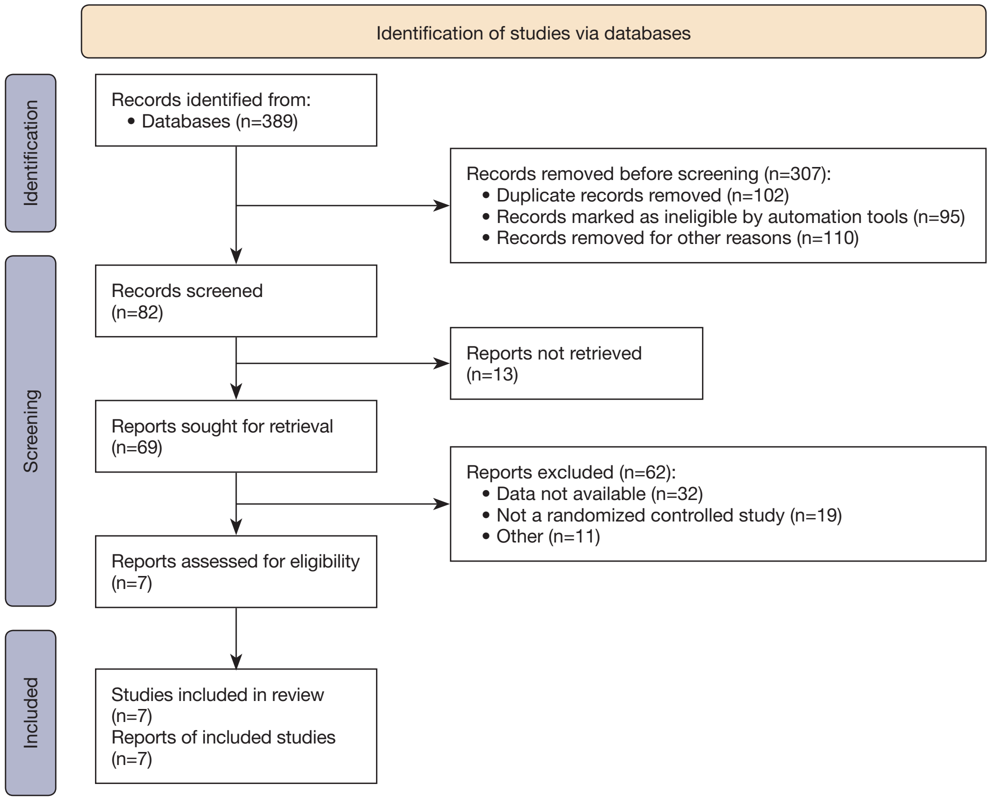

Figure 1 Literature screening process and results.

Table 1 Basic characteristics of the included studies

Included literatures	Year	Sample size (intervention/control)	Grouping	Baseline information
Hao-Wei Jiang (14)	2022	54 (20/34)	Random	Comparable
Jinchao Xu (15)	2022	197 (102/95)	Random	Comparable
Pan Chen (16)	2022	23 (23/0)	Random	Comparable
Seung-Kook Kim (17)	2018	141 (71/70)	Random	Comparable
Aygun H (18)	2021	77 (36/41)	Random	Comparable
Pao JL (19)	2020	81 (41/40)	Random	Comparable
Carragee EJ (20)	2003	187 (105/82)	Random	Comparable

the systematic evaluation. The literature screening process and results are shown in *Figure 1*.

Basic characteristics of the included studies

Ultimately, 7 articles were included in the meta-analysis, with a total sample size of 760 cases, including 398 cases in the UBE group and 362 cases in the control group. The basic characteristics of the included literature are shown in *Table 1* (14-20).

Evaluation of the quality of the included articles

Of the 7 included articles, all the articles mentioned the word "randomization", all the articles had complete outcome data, and none of the articles engaged in the selective reporting of results; however, the other sources of bias were uncertain (see *Table 2*) (14-20).

Table 2 Risk-bias evaluation of the included articles

Included literatures	Sequence generation	Baseline characteristics	Concealed grouping	Implementation bias		Measurement bias		Missed visit bias	Selective reporting of results	Other biases
				Random	Blinded method	Randomness of results	Blinded method	Incomplete data reporting		
Hao-Wei Jiang (14)	Yes	Yes	Uncertain	Yes	Uncertain	Uncertain	No	Yes	No	Uncertain
Jinchao Xu (15)	Yes	Yes	Uncertain	Yes	Uncertain	Uncertain	No	Yes	No	Uncertain
Pan Chen (16)	Yes	Yes	Uncertain	Yes	Uncertain	Uncertain	No	Yes	No	Uncertain
Seung-Kook Kim (17)	Yes	Yes	Uncertain	Yes	Uncertain	Uncertain	No	Yes	No	Uncertain
Aygun H (18)	Yes	Yes	Uncertain	Yes	Uncertain	Uncertain	No	Yes	No	Uncertain
Pao JL (19)	Yes	Yes	Uncertain	Yes	Uncertain	Uncertain	No	Yes	No	Uncertain
Carragee EJ (20)	Yes	Yes	Uncertain	Yes	Uncertain	Uncertain	No	Yes	No	Uncertain

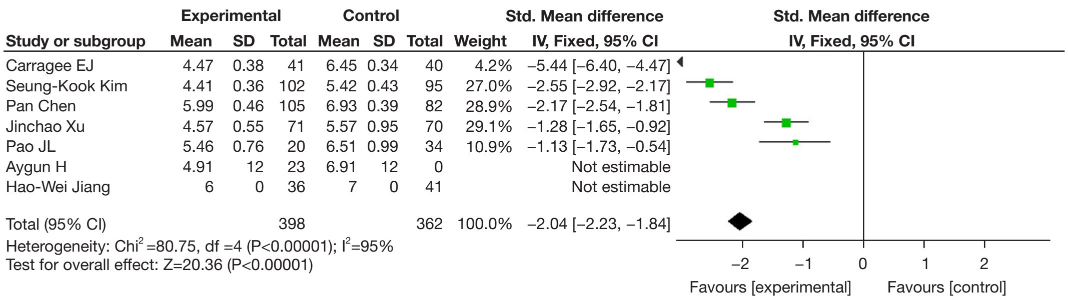

Figure 2 Meta-analysis of length of hospital stay.

Length of hospitalization

In relation to the results for the length of hospital stay, there was statistical heterogeneity between the 2 groups (I^2=95%, P<0.0001); Therefore, the random effects model is used. The results of meta-analysis showed that the length of hospital stay in UBE patients was significantly shorter than that in the control group (MD =−2.04; 95% CI: −2.23 to −1.84; P<0.05) (*Figure 2*).

Pain VASs

The forest plot yielded a combined posterior effect size of P=0.11, which indicated that there was no difference in the VASs between the 2 groups at the baseline. However, the results of the meta-analysis showed that the postoperative VAS in the UBE group showed better improvement compared to the control group at the final follow-up, but the difference was not statistically significant (MD =−0.12; 95% CI: −0.27 to 0.03; P=0.11) (*Figure 3*).

Intraoperative bleeding

We analyzed the intraoperative bleeding indicators and found them to be heterogeneous (I^2=40%, P=0.14). Therefore, a random effects model was used. The results of the meta-analysis showed that the UBE group had less intraoperative bleeding than the control group, but the difference between the 2 groups was not statistically significant (MD =−0.07; 95% CI: −0.21 to 0.08; P=0.37) (*Figure 4*).

ODI

The forest plot yielded a post-merger effect size of P=0.17, which indicated that there was no difference in the Oswestry dysfunction index (ODI) scores between the 2 groups at baseline and that a follow-up meta-analysis could be performed. The results of the meta-analysis showed that the ODI scores improved more among patients in the UBE group at the final follow-up, but the difference was not

Study or subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight	Std. Mean difference IV, Fixed, 95% CI
Hao-Wei Jiang	1.23	0.2	36	1.59	0.02	41	5.9%	−2.59 [−3.21, −1.98]
Pao JL	1.46	0.76	20	1.51	0.99	34	7.3%	−0.05 [−0.61, 0.50]
Seung-Kook Kim	1.41	0.36	102	1.42	0.43	95	28.4%	−0.03 [−0.30, 0.25]
Aygun H	1.91	12	23	2.01	0.1	0		Not estimable
Jinchao Xu	1.57	0.55	71	1.57	0.95	70	20.3%	0.00 [−0.33, 0.33]
Carragee EJ	1.47	0.38	41	1.45	0.34	40	11.7%	0.05 [−0.38, 0.49]
Pan Chen	1.99	0.46	105	1.93	0.39	82	26.5%	0.14 [−0.15, 0.43]
Total (95% CI)			398			362	100.0%	−0.12 [−0.27, 0.03]

Heterogeneity: Chi^2 =67.01, df =5 (P<0.00001); I^2=93%
Test for overall effect: Z=1.58 (P=0.11)

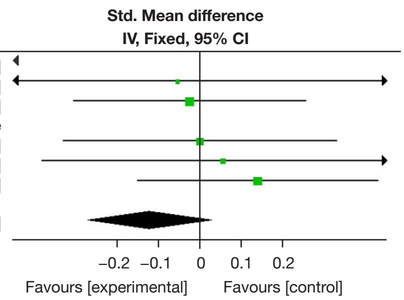

Figure 3 Meta-analysis of pain VASs. VAS, visual analogue score.

Study or subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight	Std. Mean difference IV, Fixed, 95% CI
Hao-Wei Jiang	125.23	10.2	36	131.59	10.02	41	10.1%	−0.62 [−1.08, −0.16]
Pao JL	125.46	10.76	20	129.51	10.99	34	6.8%	−0.37 [−0.92, 0.19]
Seung-Kook Kim	129.41	10.36	102	129.42	10.43	95	27.1%	−0.00 [−0.28, 0.28]
Aygun H	126.91	19.12	23	126.01	18.1	0		Not estimable
Jinchao Xu	123.57	10.55	71	123.57	10.95	70	19.4%	0.00 [−0.33, 0.33]
Carragee EJ	131.47	10.38	41	131.45	10.34	40	11.2%	0.00 [−0.43, 0.44]
Pan Chen	131.99	10.46	105	131.11	10.39	82	25.4%	0.08 [−0.20, 0.37]
Total (95% CI)			398			362	100.0%	−0.07 [−0.21, 0.08]

Heterogeneity: Chi^2 =8.27, df =5 (P=0.14); I^2=40%
Test for overall effect: Z=0.89 (P=0.37)

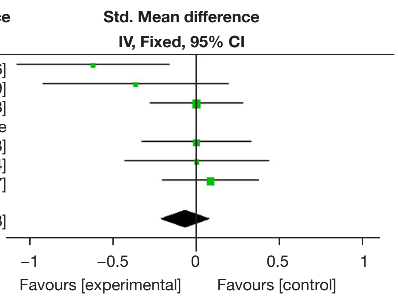

Figure 4 Meta-analysis of intraoperative bleeding.

Study or subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight	Std. Mean difference IV, Fixed, 95% CI
Hao-Wei Jiang	6.23	0.2	36	6.59	0.02	41	9.2%	−2.59 [−3.21, −1.98]
Pan Chen	6.99	0.46	105	7.11	0.39	82	41.4%	−0.28 [−0.57, 0.01]
Pao JL	6.46	0.76	20	6.51	0.99	34	11.4%	−0.05 [−0.61, 0.50]
Aygun H	11.91	1.12	23	7.01	1.1	0		Not estimable
Jinchao Xu	6.57	0.55	71	6.57	0.95	70	32.0%	0.00 [−0.33, 0.33]
Seung-Kook Kim	9.41	0.36	102	6.42	0.43	95	5.4%	7.53 [6.73, 8.34]
Carragee EJ	12.47	0.38	41	6.45	0.34	40	0.5%	16.53 [13.88, 19.17]
Total (95% CI)			398			362	100.0%	0.13 [−0.06, 0.32]

Heterogeneity: Chi^2 =559.34, df =5 (P<0.00001); I^2=99%
Test for overall effect: Z=1.37 (P=0.17)

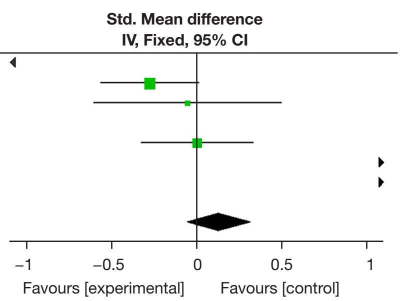

Figure 5 Meta-analysis of the ODI. ODI, Oswestry dysfunction index.

statistically significant (MD =0.13; 95% CI: −0.06 to 0.32; P=0.17) (*Figure 5*).

Complications

There was no statistical heterogeneity between the 2 groups in terms of the postoperative complications (I^2=0%, P=1.00); thus, the meta-analysis was performed using a fixed-effects model. The meta-analysis results showed a lower complication rate in the UBE group, but the difference was not statistically significant (MD =0; 95% CI: −0.15 to 0.15; P=1.00) (*Figure 6*).

Sensitivity analysis

Two independent samples *t*-test was used to compare the difference of the pooled point estimate and interval estimate between the random effect model and the fixed effect model. This method was used to conduct sensitivity analysis to examine whether there were significant changes in the conclusions of the meta-analysis. The *t* value of hospitalization length, VAS, Intraoperative bleeding, ODI

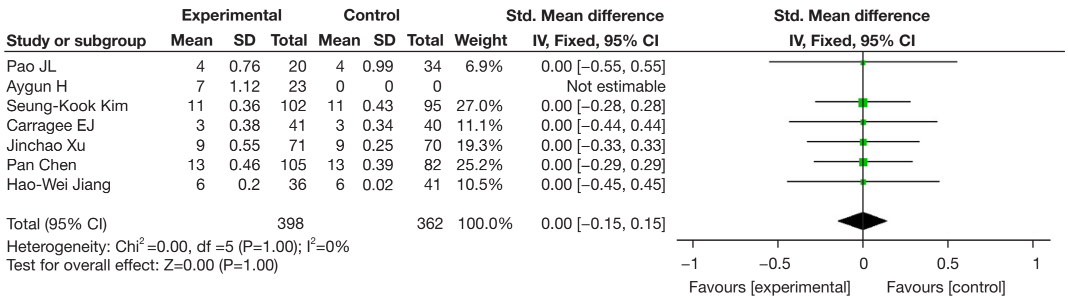

Figure 6 Meta-analysis of complications.

Table 3 Sensitivity analysis

Influencing factors	Peto method		D-L method		Sensitivity analysis
	OR	95% CI	OR	95% CI	
Length of hospitalization	1.22	0.92–1.21	1.13	0.91–1.26	*t*=0,0558, v=25, P>0.05
VAS	1.62	1.33–2.05	1.66	1.12–2.26	*t*=0.0806, v=26, P>0.05
Intraoperative bleeding	0.94	0.81–1.14	0.97	0.84–1.11	*t*=0.0703, v=23, P>0.05
ODI	1.17	0.91–1.64	1.27	0.95–1.19	*t*=0.0608, v=26, P>0.05
Complications	1.13	0.96–1.08	1.28	0.89–1.13	*t*=0,0558, v=24, P>0.05

D-L, Dersimonian-Laird; VAS, Visual Analogue Scale; ODI, Oswestry dysfunction index; OR, odds ratio; CI, confidence interval.

and complications were 0.000–0.081, v was 20–26, all P>0.05, suggesting that this conclusion was stable (*Table 3*).

Discussion

LDH is one of the most common spinal diseases, has the highest incidence in patients around 40 years of age, and often manifests as low back pain and lower glute radiating pain, which can cause cauda equina symptoms in severe cases (21). Patients with LDH that develops into free LDH should be treated with surgery as early as possible, as untimely treatment is likely to place pressure on patients' nerves and may even lead to the development of cauda equina syndrome, which is more difficult to treat (22). Common procedures, such as percutaneous single-channel laminectomy and percutaneous endoscopic lumbar discectomy, are minimally invasive and have low complications, and have been shown to have certain efficacy in clinical practice (23). However, they also have problems, such as a small operative field and a limited decompression range (24). The results of our study showed that the UBE technique can safely and effectively treat patients with free LDH.

Dual channels within the UBE technique have shown to effectively widen the surgical field in previous studies (6,7). In addition, spinal decompression tools are more flexible, and since two channels are used, the size of operating instruments is not limited, resulting in an efficient procedure. The UBE technique can achieve clinically satisfactory results in the treatment of patients with free LDH, and in addition to the advantages of a minimally invasive surgery, it can also achieve decompression (25). The results of our study are basically consistent with those of previous studies (6,7,25), which suggests that the UBE technique can be effectively used clinically for the treatment of free LDH.

Under the UBE technique, 2 working channels are constructed on a patient's unilateral side; 1 channel for the placement of the arthroscope to provide a visual field, and the other channel for the placement of conventional spinal surgical instruments (26). The UBE technique reduces the trauma of open surgery on paravertebral tissues, such as small joints, ligaments and muscles, in a minimally invasive manner and reduces the disruption to the biomechanical stability of the spine (27). The UBE technique has the following advantages: it provides a wider field of view and operating space; it enables continuous saline irrigation, which maintains a clear surgical field of view; and it results in cost savings, as both the surgical instruments and arthroscopy are conventional equipment (28). As the UBE operation is similar to that of open surgery, it is also less difficult to learn for physicians with experience in open surgery (29). The UBE is widely indicated and has good efficacy in the treatment of diseases, such as LDH and epidural peptide swelling (30). The UBE technique was used for a long time because of its many advantages, but it was gradually stopped being used following the rapid development of single-channel operations; however, after improvements and innovations by Korean scholars, it has begun to be re-appreciated and promoted by domestic physicians in recent years (31).

Since we started using this technique at the end of 2020, we found that there are still many intraoperative difficulties and shortcomings that require attention and improvement. For example, to avoid positioning errors when establishing the working channel. Fluoroscopy should be confirmed at the inferior edge of the vertebral plate using a positioner, and a C-arm should also be used for preoperative positioning (29). Since the small arterial plexus near the small articular processes of the vertebral body is more abundant, it is easy to cause bleeding during blunt separation, resulting in a blurred visual field (32). To ensure a clearer visual field during the procedure and the safety of the subsequent surgery. The use of plasma RF tip and hemostatic material filling is an effective method of controlling intraoperative bleeding (32).

As the UBE technique requires continuous flushing to guarantee a clear visual field, the pressure of the salt solution used must be controlled at 25–30 mmHg; if the pressure is too low, the visual field will become blurry, and if the pressure is too high, the internal pressure will increase, causing irritation, which may cause the patient to suffer from headache and other symptoms after awakening from the anesthesia (33). In addition, gravity-guided salt solution flushing should be chosen over an infusion pump where possible, as the continuous infusion of a salt solution will elevate the pressure if the solution outflow is obstructed when an infusion pump is used (34). Intervertebral discs can be treated with the UBE technique by removing parts of the upper and lower vertebral bodies. Nonetheless, removing too much of the plate may cause lumbar instability and recurrent low back pain (35).

Surgically, we tend to treat the articular eminence joint in a minimal manner, treating only a part of the superior lamina. It is also important to preserve the inferior lamina as much as possible, so the yellow way can be broken into the dural surface, which is less harmful (36). Dural tears are the most likely complication of this approach. This was primarily due to the operator's discomfort with the endoscope's two-dimensional plane during the early stages of the study, because it is easy to injure during the breaking of the yellow and the removal of the ligamentum flavum, this procedure requires careful manipulation in order to avoid injury. In order to remove as much ligamentum flavum as possible along the nerve root's path, the dura must be carefully separated from the ligamentum flavum (37). In addition, grinding drills should be used with caution to prevent tears in the peridural fibrous bands and vascular bundles from becoming entangled in the necks of the grinding drill (38).

This study had a number of limitations. First, the number of studies comparing the efficacy of UBE for LDH was low. Second, the sample size of the included study was small, a multicenter RCT of UBE discectomy is needed to collect high-quality evidence and establish more solid recommendations for practice. Finally, this study did not consider the effect of the operators' surgical experience on the study outcomes. Differences in surgeons and surgical techniques may have also affected the outcomes.

Conclusions

In conclusion, UBE discectomy was used to treat LDH, and good clinical results were obtained. Specifically, patients in the UBE group spent less time in the hospital than the control group, and UBE group patients also woke up earlier than the control group. Therefore, UBE discectomy has certain reference value and can be popularized in clinic.

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Footnote

Reporting Checklist: The authors have completed the PRISMA reporting checklist. Available at https://apm.amegroups.com/article/view/10.21037/apm-22-1364/rc

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://apm.amegroups.com/article/view/10.21037/apm-22-1364/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References

1. Kreiner DS, Hwang SW, Easa JE, et al. An evidence-based clinical guideline for the diagnosis and treatment of lumbar disc herniation with radiculopathy. Spine J 2014;14:180-91.
2. Delgado-López PD, Rodríguez-Salazar A, Martín-Alonso J, et al. Lumbar disc herniation: Natural history, role of physical examination, timing of surgery, treatment options and conflicts of interests. Neurocirugia (Astur) 2017;28:124-34.
3. Rogerson A, Aidlen J, Jenis LG. Persistent radiculopathy after surgical treatment for lumbar disc herniation: causes and treatment options. Int Orthop 2019;43:969-73.
4. Demirel A, Yorubulut M, Ergun N. Regression of lumbar disc herniation by physiotherapy. Does non-surgical spinal decompression therapy make a difference? Double-blind randomized controlled trial. J Back Musculoskelet Rehabil 2017;30:1015-22.
5. Wang L, He T, Liu J, et al. Revealing the Immune Infiltration Landscape and Identifying Diagnostic Biomarkers for Lumbar Disc Herniation. Front Immunol 2021;12:666355.
6. Karademir M, Eser O, Karavelioglu E. Adolescent lumbar disc herniation: Impact, diagnosis, and treatment. J Back Musculoskelet Rehabil 2017;30:347-52.
7. Rasouli MR, Rahimi-Movaghar V, Shokraneh F, et al. Minimally invasive discectomy versus microdiscectomy/open discectomy for symptomatic lumbar disc herniation. Cochrane Database Syst Rev 2014;(9):CD010328.
8. Kim M, Lee S, Kim HS, et al. A Comparison of Percutaneous Endoscopic Lumbar Discectomy and Open Lumbar Microdiscectomy for Lumbar Disc Herniation in the Korean: A Meta-Analysis. Biomed Res Int 2018;2018:9073460.
9. Zhou C, Zhang G, Panchal RR, et al. Unique Complications of Percutaneous Endoscopic Lumbar Discectomy and Percutaneous Endoscopic Interlaminar Discectomy. Pain Physician 2018;21:E105-12.
10. Pan M, Li Q, Li S, et al. Percutaneous Endoscopic Lumbar Discectomy: Indications and Complications. Pain Physician 2020;23:49-56.
11. Kim W, Kim SK, Kang SS, et al. Pooled analysis of unsuccessful percutaneous biportal endoscopic surgery outcomes from a multi-institutional retrospective cohort of 797 cases. Acta Neurochir (Wien) 2020;162:279-87.
12. Kim JE, Yoo HS, Choi DJ, et al. Learning Curve and Clinical Outcome of Biportal Endoscopic-Assisted Lumbar Interbody Fusion. Biomed Res Int 2020;2020:8815432.
13. Su Y, Wang W, Liu F, et al. Blosozumab in the treatment of postmenopausal women with osteoporosis: a systematic review and meta-analysis. Ann Palliat Med 2022;11:3203-12.
14. Jiang HW, Chen CD, Zhan BS, et al. Unilateral biportal endoscopic discectomy versus percutaneous endoscopic lumbar discectomy in the treatment of lumbar disc herniation: a retrospective study. J Orthop Surg Res 2022;17:30.
15. Xu J, Wang D, Liu J, et al. Learning Curve and Complications of Unilateral Biportal Endoscopy: Cumulative Sum and Risk-Adjusted Cumulative Sum Analysis. Neurospine 2022;19:792-804.
16. Chen P, Zheng DY, Ding WG, et al. Unilateral biportal endoscopic discectomy for high-grade migrated lumbar disc herniation. Chinese Journal of Reparative and Reconstructive Surgery 2022;36:860-5.
17. Kim SK, Kang SS, Hong YH, et al. Clinical comparison of unilateral biportal endoscopic technique versus open microdiscectomy for single-level lumbar discectomy: a multicenter, retrospective analysis. J Orthop Surg Res 2018;13:22.
18. Aygun H, Abdulshafi K. Unilateral Biportal Endoscopy Versus Tubular Microendoscopy in Management of Single Level Degenerative Lumbar Canal Stenosis: A Prospective Study. Clin Spine Surg 2021;34:E323-8.
19. Pao JL, Lin SM, Chen WC, et al. Unilateral biportal endoscopic decompression for degenerative lumbar canal stenosis. J Spine Surg 2020;6:438-46.
20. Carragee EJ, Han MY, Suen PW, et al. Clinical outcomes after lumbar discectomy for sciatica: the effects of fragment type and anular competence. J Bone Joint Surg Am 2003;85:102-8.

21. Mo Z, Zhang R, Chen J, et al. Comparison Between Oblique Pulling Spinal Manipulation and Other Treatments for Lumbar Disc Herniation: A Systematic Review and Meta-Analysis. J Manipulative Physiol Ther 2018;41:771-9.
22. Karimi N, Akbarov P, Rahnama L. Effects of segmental traction therapy on lumbar disc herniation in patients with acute low back pain measured by magnetic resonance imaging: A single arm clinical trial. J Back Musculoskelet Rehabil 2017;30:247-53.
23. Xu J, Ding X, Wu J, et al. A randomized controlled study for the treatment of middle-aged and old-aged lumbar disc herniation by Shis spine balance manipulation combined with bone and muscle guidance. Medicine (Baltimore) 2020;99:e23812.
24. Zhang R, Zhang SJ, Wang XJ. Postoperative functional exercise for patients who underwent percutaneous transforaminal endoscopic discectomy for lumbar disc herniation. Eur Rev Med Pharmacol Sci 2018;22:15-22.
25. Kanno H, Aizawa T, Hahimoto K, et al. Minimally invasive discectomy for lumbar disc herniation: current concepts, surgical techniques, and outcomes. Int Orthop 2019;43:917-22.
26. Heo DH, Lee N, Park CW, et al. Endoscopic Unilateral Laminotomy with Bilateral Discectomy Using Biportal Endoscopic Approach: Technical Report and Preliminary Clinical Results. World Neurosurg 2020;137:31-7.
27. Abudurexiti T, Qi L, Muheremu A, et al. Micro-endoscopic discectomy versus percutaneous endoscopic surgery for lumbar disk herniation. J Int Med Res 2018;46:3910-7.
28. Goker B, Aydin S. Endoscopic Surgery for Recurrent Disc Herniation After Microscopic or Endoscopic Lumbar Discectomy. Turk Neurosurg 2020;30:112-8.
29. Phan K, Xu J, Schultz K, et al. Full-endoscopic versus micro-endoscopic and open discectomy: A systematic review and meta-analysis of outcomes and complications. Clin Neurol Neurosurg 2017;154:1-12.
30. Yu P, Qiang H, Zhou J, et al. Percutaneous Transforaminal Endoscopic Discectomy versus Micro-Endoscopic Discectomy for Lumbar Disc Herniation. Med Sci Monit 2019;25:2320-8.
31. Tang J, Liang Z, He J, et al. Percutaneous Endoscopic Lumbar Discectomy for Lumbar Disc Herniation Using an Endoscopic Staining: A Technical Note. Orthop Surg 2021;13:1430-6.
32. Yan D, Zhang Z, Zhang Z. Residual leg numbness after endoscopic discectomy treatment of lumbar disc herniation. BMC Musculoskelet Disord 2020;21:273.
33. Fan N, Yuan S, Du P, et al. Design of a robot-assisted system for transforaminal percutaneous endoscopic lumbar surgeries: study protocol. J Orthop Surg Res 2020;15:479.
34. Yoshikane K, Kikuchi K, Okazaki K. Posterolateral Transforaminal Full-Endoscopic Lumbar Discectomy for Foraminal or Extraforaminal Lumbar Disc Herniations. World Neurosurg 2021;146:e1278-86.
35. Li X, Hu Z, Cui J, et al. Percutaneous endoscopic lumbar discectomy for recurrent lumbar disc herniation. Int J Surg 2016;27:8-16.
36. Ghimire P, Lavrador JP, Grahovac G. Letter to the Editor Regarding "A Historical Review of Endoscopic Spinal Discectomy". World Neurosurg 2021;150:229-30.
37. Zhu K, He D. Transforaminal percutaneous endoscopic discectomy for symptomatic gas-filled discal cysts-report of three cases and literature review. J Orthop Surg Res 2021;16:251.
38. Fujita M, Kitagawa T, Hirahata M, et al. Comparative Study between Full-Endoscopic Discectomy and Microendoscopic Discectomy for the Treatment of Lumbar Disc Herniation. Medicina (Kaunas) 2020;56:710.

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