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Microendoscopic bilateral Decompression via Unilateral Approach in Single and Multiple Level Lumbar Canal Stenosis: A Series of 583 Cases

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Abstract

Background Data: Traditionally, lumbar canal stenosis (LCS) has been treated with conventional laminectomy involving wide resection of posterior supporting structures of the lumbar spine such as the supraspinous and inter-spinous ligamentum complex, the spinous process as well as wide areas of the lamina. In addition, this required a large incision of the skin and underlying musculoligamentous complex (posterior tension band).

Purpose: The current study focuses on the clinical outcome and utility of minimally invasive microendoscopic decompression from a unilateral approach in surgical management of patients with single and multiple level lumbar canal stenosis. The objective is to describe the indications, significance and applications of endoscopic spine surgery in patients with single and multiple level LCS. Additionally, to highlight important anatomical perspectives of the technique and share surgical experience and results.

Study Design: A retrospective clinical case study.

Patients and Methods: From May 2008 to January 2016, 583 consecutive patients were treated for LCS and included in this study. Patients' main complaint was bilateral neurogenic claudication in addition to back pain and sciatic neuralgia. Single level decompression was performed in 468 (80%) patients and multiple level decompressions in 115 (20%) patients. Magnetic resonance imaging (MRI), computed tomography (CT) scan and plain X-rays were performed for all patients to confirm evidence of central stenosis and then repeated postoperatively. All patients were followed up for at least 3 months and their data collected. Clinical and functional outcomes were assessed using Visual Analogue Scale (VAS) and the Japanese Orthopedic Association Score (JOA) score for lumbar disease.

Results: Compared to preoperative complaint, there was an improvement of back pain in 77.9% of patients and in radiating leg pain in 86.3%. With regards to functional outcomes, median preoperative JOA score was 14.93 ± 0.48 and improved postoperatively to 27.17 ± 1.45 ($p < 0.001$). The mean operating time per level was 78 minutes, and the mean intraoperative blood loss per level was 18 ml. Complications mainly included dural tears in 27 (4.6%) patients, transient postoperative dysesthesia in 46/583 (7.9%) patients and excess bony work in the form of unintended medial facetectomy in 38/583 (6.5%) patients and fracture of the spinous process in 3 (0.5%) patients.

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Conclusion: The microendoscopic decompression technique via a unilateral approach is a minimally invasive surgery that is safe and effective in treatment of single or multiple level lumbar spinal stenosis. It is associated with favorable clinical results and high patient satisfaction. (2017ESJ149)
Keywords: bilateral decompression; lumbar canal stenosis; unilateral laminotomy; microendoscopic decompression

Introduction

Average life span and years of functional activity are prolonged cause of incessant medical advancements. Thence, elderly population frequently presents with degenerative lumbar spine disorders whereas lumbar canal stenosis (LCS) constitutes a considerable portion.[11,30,31] Patients suffering from LCS receive conservative treatment as a primary line of management for symptomatic relief, however; treatment failure or progression of neurological symptoms designate necessity for surgical resolution.[4,50]

On a traditional basis, open decompressive laminectomy has been exceedingly utilized in management of LCS refractory to medical treatment with variable success rate ranging between 62-70%.[35,50,54] Nonetheless, post-procedural delayed spinal instability with concomitant rise in fusion procedures attributable to loss of native support taken over by posterior osseoligamentous structures was a major concern.[10,47] Moreover, higher incidence of failed-back syndrome owing to extensive surgical resection is considered another major drawback.[24]

Coinciding with tendency towards minimizing iatrogenic tissue injury over the last decade, Spetzger et al,[44] introduced the microsurgical bilateral decompression via a unilateral approach which was further modified in 1998 by McCulloch and Young.[28] Inspired by Foley and Smith's microendoscopic discectomy procedure dedicated for disc herniation pathologies, microendoscopic decompression laminotomy (MEDL) via unilateral approach has emerged as an outstanding treatment for LCS.[12,34]

Despite technical skills that ought to be gained and intra-procedurally met technical difficulties; microendoscopic unilateral laminotomy for bilateral decompression is coupled with various benefits like maintenance of spinal stability, better patient satisfaction and relatively low rate of complication.[20,21,41] The purpose of this study is to investigate the efficacy of the technique in a large cohort having single and multiple LCS and also to portray its safety, clinical and functional outcome through short-term follow-up.

Patients and Methods

This study was conducted between May 2008 and January 2016 at the Department of Neurosurgery of Ain-Shams University Hospitals in addition to one other community hospital (Greek Community Hospital of Cairo). Exempting seventeen patients who lost their follow-up visits, a total of 583 patients (364 men and 219 women) with LCS were included in this study and underwent microendoscopic bilateral decompressive surgery via the unilateral approach by the principal surgeon. Mean age at the time of surgery was 66.8 (Range, 52-76) years.

Patients were included in our study upon having symptomatic central LCS manifested by bilateral neurogenic claudication (radicular leg pain that is aggravated by prolonged standing or walking and relieved by flexion and/ or resting) adding to back pain and sciatic neuralgia for which they received conservative medical treatment for three consecutive months, yet yielded unsatisfactory results. Diagnosis was confirmed by radiological interrogation inclusive of static and dynamic plain lumbar radiography, magnetic resonance imaging (MRI), computed tomography (CT) scan; that were repeated following the procedure. Exclusion criteria comprised prior history of spinal surgery, patients having spondylolisthesis or scoliosis as well as LCS implicating more than three lumbar levels.

Surgical Procedure:

Prior to the procedure, an informed consent was taken from all patients. All surgical operations were performed under general anesthesia while patient is placed in prone position. Guided by fluoroscopic C-arm, the correct spinal level is defined using a custom-designed localizer. An approximate 20 mm skin incision is made just lateral to the midline on the more symptomatic side targeting the inter-laminar

space whilst permitting multi-level decompression up to 3 levels. A longitudinal incision is made in the fascia and the para-spinal musculature is then gently stripped laterally from over the spine. A special endoscopic obturator of the Endospine® system (Karl Storz GmbH & Co., Tuttlingen, Germany) is advanced till the inter-laminar space. The obturator is then removed followed by insertion of the endoscopic insert and endoscope. Fluoroscopy is then repeated to ensure the exact working level and positioning.

For adequate visualization of bony borders; bipolar cautery, as well as pituitary forceps are utilized to strip off any muscular and soft tissue remnants covering the laminae and laminofacetal junction. A step-wise decompression is performed commencing with ipsilateral laminotomy. A high speed micro-drill coupled with Kerrison rongeurs are utilized to resect the caudal portion of the superior hemi-lamina and the cranial portion of the inferior hemi-lamina whilst maintaining architecture and integrity of the facet joint.

Subsequently, the base of spinous process and the base of contralateral hemi-lamina are undercut via the micro-drill allowing clear visualization of contralateral field. Complete exposure of ligamentum flavum till its sub-laminar insertion is then accomplished followed by mid-line splitting and resection via angled Kerrison rongeur and micro-dissectors until clear depiction of the dura. Bilateral flavectomy is the final step carried out before approaching dural sac. Bilateral decompression of lateral recess is then performed till the end-point harmonious with visualization of bilateral nerve roots.

At the end of the operation the lumbar fascia is closed with a single suture and the skin with absorbable sutures and the incision covered with a small Band-Aid with no drain. All patients, including those with iatrogenic dural tears were mobilized 6 hours following the procedure. Analgesics were given for pain control. Patients were then discharged on same day of operation or a day after.

Pre and Post-procedural Evaluation:

Following the surgery, all patients were regularly evaluated at preset clinical follow-up visits at 4 weeks and 3 months. Adding to demographic data; the following data were gathered (1) Intraoperative parameters inclusive of operative time, blood loss adding to location and number of operated levels (2) Postoperative measures encompassing clinical & functional outcome, nature and rate of complications as well as length of hospital stay.

Clinical and Functional outcomes were analyzed utilizing Visual analogue scale for back and leg pain (VAS score from 0 to 10 where 0 indicate no pain and 10 points out the worst possible pain) as well as Japanese Orthopedic Association (JOA) score (maximum 29 points)[19] for low back pain. Both measures were applied pre-procedural and 3 months post-operative. Recovery rate which signifies clinical outcome was calculated as follows: recovery rate = 100 × (postoperative JOA score - preoperative JOA score)/ (29 - preoperative JOA score. As proposed by Hirabayashi et al,[18] four grades were obtained in relevance to rate of improvement: Excellent (75% and greater), good (50% to 74%), fair (25% to 49%), and poor (0 to 24%). Treatment success was interpreted as more than 25% improvement in JOA score.

IBM SPSS statistics (V. 24.0, IBM Corp., USA, 2016) was used for data analysis. Data were expressed as Mean±SD for quantitative parametric measures in addition to Median Percentiles for quantitative non-parametric measures and both number and percentage for categorized data. The following tests were done: (1) Wilcoxon signed rank test for comparison between two dependent groups for non-parametric data (2) Ranked Spearman correlation test to study the possible association between each two variables among each group for non-parametric data. The probability of error at 0.05 was considered sig., while at 0.01 and 0.001 are highly significant.

Results

Five hundred and eighty-three patients divided into 364 men (62.4%) and 219 women (37.6%) met the inclusion criteria and fulfilled their follow-up visits. Seventeen patients were lost to follow-up yielding a follow up rate of 97.2%. The mean age was 66.8 years; ranging between 52 and 76 years. Of the 583 patients, 100% reported radiating lower limb neurogenic claudication pains while back pain and/or sciatic neuralgia were present in 96.4 % of patients. Patients demonstrated evidence of

spondylolisthesis or spinal instability were excluded from our study.

The overall number of levels operated upon were 707 levels. Single level decompression was performed in 468 (80%) patients and multiple level decompressions in 115 (20%) patients distributed as follow: two-level stenosis in 106/583 (18%) patients, three- level stenosis in 9/583 (2%) of patients. Per-level analysis; from a total of 707 levels operated upon, decompressive surgery was performed at L1 L2 in 1% (7/707), L2 L3 in 6% (42/707), L3 L4 in 39% (208/707), L4 L5 in 43%(241/707), and L5 S1 in 11% (85/707). The mean operating time per level was 78.4±26.5 minutes, and the mean intraoperative blood loss per level was 18.6 ml. The mean hospital stay following spinal decompressive surgery was 1.4±0.7 days. (Table 1)

All patients were followed up at 3 months postoperative. On evaluation of functional outcome, there was a highly significant ($P < 0.001$) improvement of median JOA score from 15 preoperatively to 27 at 3 months following the procedure ($P < 0.001$). The median recovery rate of JOA score was 86.67% (Range, 77.78-94.12%). Among our patients, the overall results were excellent in 66.2% of the patients, good in 14.2%, fair in 14.4%, and poor in 4.1%. (Table 2)

During follow-up visit, post-procedural patients' responses as regard radiating leg pain and back pain were collected. Comparable to preoperative complaints at 1 and 3 months follow-up, a highly significant decrease of median VAS score for leg pain ($P<0.001$) was depicted. Descriptive statistics for the improvement between preoperative and 1 month post-operatively (dC1_Pre) shows that among 583 patients; the median decreased VAS leg pain=0.75. The minimum decrease was 1.00, however the maximum one increased i.e. deteriorated by 0.6. Symptomatic improvement was observed in 84.0% of patients whilst 9.3% (N=54) reported persistent symptoms with same degree. Thirty nine patients (6.7%) experienced symptomatic deterioration, yet the total results improved at 3 months visit that 86.3% declared betterment and 13.7% remain unchanged.

Similarly, the median VAS scores for back pain at 1 month reduced by 0.75 (Range, 0.50-0.90) ($P<0.001$). Three hundred and twenty seven patients (58.2%) proclaimed symptomatic improvement comparable to preoperative complaint whilst 19.75% of patients reported total resolution of back pain, and 22.1 % stayed unchanged. No symptomatic deterioration for back pain was evident. Also, No statistical significance difference was noted between 1 month and 3 months follow-up. Furthermore, we found a positive highly significant correlation between VAS-leg & VAS-back among all intervals (1M-Pre; 3M-Pre & 3M-1M). However, improved recovery rate based on JOA score doesn't necessarily signify symptomatic amelioration on VAS for back and leg pain. (Figure 1)

A total of 114 (19.55%) surgery – related complications were noted. Dural tears occurred in 27 (4.6%) patients; however they were successfully repaired intraoperatively with no consequent CSF leakage. All tears were repaired endoscopically with placement of overlying small muscle pieces and an absorbable hemostatic agent (e.g. Surgicel®, Fibrillar™) in order to surgically induce a blood clot to seal the tear. Any emerging rootlets out of the dura were at first gently reinserted with help of a small cottonoid and a micro-dissector. This is followed with tight closure and postoperative elastic adhesive tight plaster compressing the suture line and entire lower back area. The tight compression is then removed after 3 days.

Reflecting technical steep-learning curve, dural tears were more frequent in first third (3.3%) of patients enrolled for the study, stepping downward within the middle third (1.3%) to be missing within the last third. Medial facetectomy was done unintentionally in 38 (6.5%) patients. Forty-six patients encountered transient postoperative dysesthesia in 46 (7.9%) patients. Post-operative CT radiological assessment revealed 3 (0.5%) patients with fracture of spinous process, however patients were asymptomatic. Neither mortality nor reoperation attributable to postoperative spinal instability took place in this study. A comparison between preoperative and postoperative MRI in a multi-level patient as well as another intraoperative photo are shown in (Figure 2,3).

Table 1. Overall Number of Endoscopically Decompressed Levels

Number of levels per patient	L1/L2	L2/L3	L3/L4	L4/L5	L5/S1
One-level (80%)	5	29	175	194	5
Two-level (18%)	1	11	31	44	9
Three-level (2%)	1	2	2	3	1
Total number of patients	7	42	208	241	5
Each level per total levels (707)	7 (1%)	42 (6%)	208 (39%)	241 (43%)	5 (11%)

Table 2. Clinical and Functional Outcome Assessment

Outcome Parameter	Preoperative	3m follow-up
Leg pain VAS[a]	8	2
Back pain VAS[a]	8	2
JOA score [b]	15	27
Total recovery rate (%)* Excellent Good Fair Poor	86.67% 66.2 14.2 14.4 4.1	

[a] Median score

[b] Japanese Orthopaedic association scoring system (Full score = 29 points)

*Recovery rate = 100 x (postoperative JOA score - preoperative JOA score)/ (29 – preoperative JOA score). Recovery rate: Excellent (≥75%), Good (50%-74%), Fair (25-49%), Poor (< 25%)

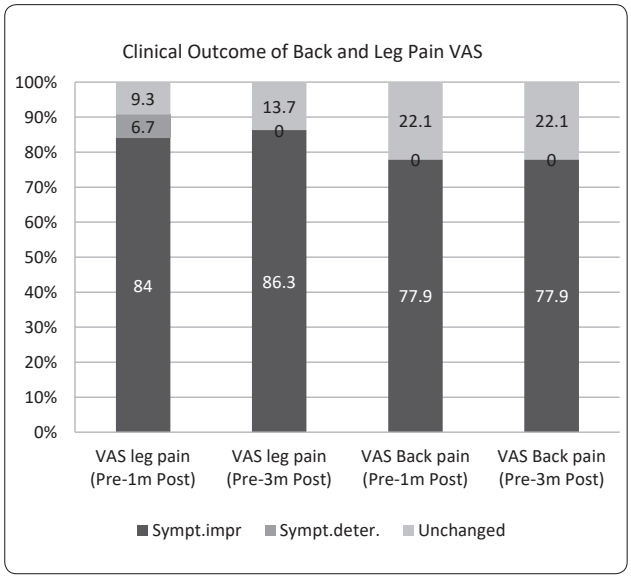

Figure 1. Clinical outcome based on VAS back and leg pain.

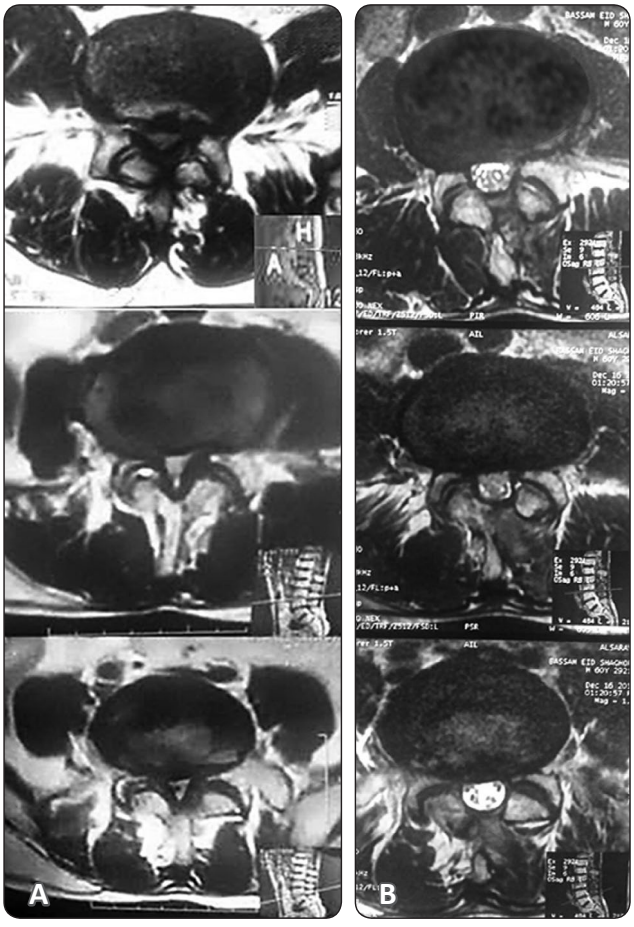

Figure 2. (A) Preoperative Axial T2-weighted MRI in a patient with L2,3,4 LCS (B) Postoperative axial T2-weighted MRI of same patient.

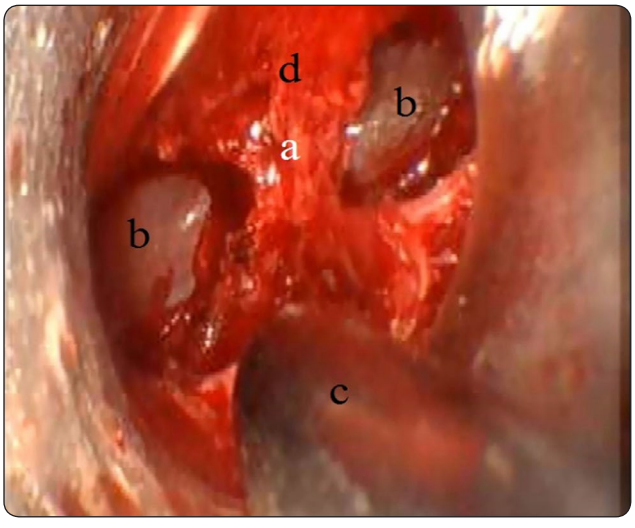

Figure 3. Intraoperative endoscopic view after right sided two-level decompression for L 4-5 and L5-S1 LCS; showing: (a) Remaining part of lamina between both levels (b) dura (c) Suction (laterally) (d) Base of spinous process (Medially).

Discussion

Biomechanical characteristics of the spinal column adding to axial forces applied upon cervical and lumbar segments predispose them to a degenerative process.[27] Generally, LCS is a frequent progressive presentation of the degenerative lumbar spine in geriatric population.[55] Stenosis may take place centrally at the central canal or laterally at the lateral recess, or the neural foramina.[8]

Interplay of variable factors comprehensive of loss of height and herniation of intervertebral disc, facet joint thickening and hypertrophy of ligamentum flavum is the main pathophysiology leading up to reduced spinal canal diameter with subsequent compression of neural elements.[14,29,33] Compression-induced ischemia of cauda equina and nerve roots provoke symptoms related to LCS which encompass neurogenic claudication described as buttock/ radiating leg pain with or without low back pain that get worsened with prolonged standing or walking and relieved with sitting or forward-leaning.[33]

Various imaging modalities are utilized to diagnose and characterize LCS including static and dynamic radiography, CT, CT myelography, and the gold standard MRI.[9,57] In the present study, we adopted imaging with CT to confirm central LCS diagnosis via measurement of cross-sectional diameter of the dural sac at the disc level.

Conservative symptomatic treatment in the form of physical therapy and medications like analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), epidural steroid injections is the primary line of treatment.[9] Nevertheless, it failed to prove long-term resolution of neurogenic claudications.[8] Johnsson et al,[23] 1992 conducted a study upon LCS patients who were managed conservatively and followed-up for almost 4 consecutive years. Only 15% of the patients show symptomatic improvement with equal percentages get worsened.

Surgical laminectomy is widely considered the treatment of choice in case of failure of conservative management or symptomatic aggravation.[25,37] Recent randomized clinical trials draw a conclusion that laminectomy is superior to medical treatment in terms of functional outcome and symptomatic relief.[26] Furthermore, the functional improvement and clearance of radiating leg pain is long-term as evident in Spine Patient Outcomes Research Trial (SPORT).[26] Many studies illustrated improvement following surgical laminectomy which escalates between 62-64% reported by Airaksinen et al,[3]and Turner et al,[49] 1992, to 70% found by Atlas et al,[6] 1996 till 64–83% efficacy yielded by Gibson and Waddell[13] in 2005.

Contrariwise, the imperative wide exposure and surgical resection is accompanied with disruption of posterior ligamentous complex increasing post-procedural spinal instability and concomitant fusion procedures which multiply incidence of re-hospitalization and major complication by two and three folds respectively.[32] Johnsson et al,[23] found 40% of postoperative slippage following laminectomies. Moreover; expansive laminectomy and multifidus denervation posterior to injury of medial branch of dorsal ramus is the proposed theory for failed back spinal surgery syndrome cause of post-operative muscular atrophy evident on electromyogram and CT.[39,46] Additionally, as a major procedure, open laminectomy is coupled with intraoperative great blood loss, lengthy procedural time and post-operative significant pain and prolonged hospital stays.[51]

Knowing that neural compromise usually takes place at the level of inter-laminar window; less invasive spine surgeries in form of laminotomy procedure has been developed as an alternate to laminectomy with advantage of preserving the posterior column function.[26,32] McCulloch's and Young[28] introduced unilateral microscopic hemilaminotomy procedure as one step ahead toward reducing tissue trauma and minimizing risk of iatrogenic post-operative instability to the lowest extent.

Over the past two decades, endoscope-assisted procedures have gained popularity in treatment of various spine pathologies.[1,31] In 1977, Foley and Smith[12] first introduced the microendoscopic discectomy for lumbar intervertebral disc herniation. Nonetheless, remarkable technical evolution ensues paradigm shift in indications for microendoscopic spine surgery from disc slippage into lumbar spinal canal stenosis where decompressive spinal laminotomy has been devised

as a conjunction between unilateral laminotomy and microendoscopic discectomy.[2]

The microendoscopic technique was later prosperously employed in management of degenerative LCS.[24] In our study, 583 patients with LCS clinically manifested in all with radiating leg pain were enrolled. The postoperative CT scans demonstrated sufficient decompression with no residual stenosis. Mean preoperative measurement of dural sac diameter on MRI in millimeters was 63.3±19.6 compared to 181.3±35.5 post-operatively with mean improvement of 118 which mirror results obtained by Hong et al,[19] Nonetheless, no statistical relationship between decompression magnitude and clinical outcome.[36]

The minimally invasive nature of MEDL for LCS goes hand in hand with lower EBL (estimated blood loss), and shorter days of hospitalization compared to open laminectomy.[43] In our study, on level analysis, the mean intra-procedural EBL was 18.6 ml which is less than presented in the literature ranging between 25 and 150 ml yielded by Asgarzadie and Khoo[5] 2007 and Xu et al,[56] 2009 respectively. In accordance but slightly less with most of MEDL currently reported studies[7,58] the mean hospitalization days following the procedure was 1.4 days however it was more than that presented by Rahman et al,[41] 2005 with mean days of 0.75.

The mean operating time per level was 78.4 minutes paralleling that of Xu et al,[56]and significantly less than that yielded by Pao et al,[38] 2007 and Wada et al,[52] 2008. Dissimilar from published studies proclaimed shorter surgery time of MEDL contrasting open laminectomy,[41] Yagi et al,[58] showed 71.1 min. as a mean operative time of MEDL comparable to 63.6 min for classic laminectomy. This may be explained by needed time to prepare the access system adding to MEDL inherent technical difficulties which encompass 2D visualization that ensues difficulty in hand-eye co-ordination and limited working space.[16,42]

In general, MEDL via unilateral approach is efficacious in attaining satisfaction and improving quality of life for patients with lumbar spinal stenosis through ameliorating clinical symptoms and improving functional outcome.[38] We found a significant improvement equal to 12 points in JOA score with a recovery rate of 87%. A success rate of 94.9% was achieved; good or excellent results were gained in 80.4% of patients. In 2 similar studies, 80%, 81% patients obtained good and excellent results.[21,38]

Regardless of short follow-up period in this study which precludes adequate evaluation of potential lumbar canal restenosis and long-term symptomatic deterioration as described for classic laminectomy[17], our patients reported an overall symptomatic improvement rate of 78% for back pain, 86.3% for leg pain based on VAS scores at 3 months post-operatively. Our results are analogous to those documented by Khoo and Fessler[24] who reported a symptomatic improvement of 84%, 90% for back and leg pain respectively.

In our study, we encountered complications in 19.55% of the patients that varied between 11.1% intraoperatively and 8.4% post-operatively. The former is divided between 6.5% accidental excessive medial facetectomy and 4.6% dural tears that were managed efficaciously during the procedure with a small piece of muscle and tight closure with no CSF leakage or pseudo-meningocele. In general, the most frequent complication in MEDL studies is incidental durotomy.[40,48] While Xu et al,[56] reported 6.25% durotomies with no CSF leakage; Castro-Menéndez et al,[7] experienced a higher percentage of 10% that were centered over the first half of the patients. Similarly, unintended durotomies in our study took place to a larger extent within the first third and disappeared within the last group of operated patients. This may be attributable to previously mentioned steep learning curve of the operators. Moreover, Pao et al,[38] correlated incidence of dural tears with severity of stenosis and approach method. Thence, utilizing special equipments while performing MEDL and retaining ligamentum flavum till finishing the bony work are advantageous in reducing risk of the above complication as recommended by Pao and Stadler.[45] Wong et al,[53] concluded a statistically significant higher rate of CSF leaks in open laminectomy compared to MEDL with increased likelihood of reoperation.

Medial facetectomy occasionally occurred accidentally due to too much bony work; however no iatrogenic spinal instability was noticed in this

study. Following MEDL for lumbar spinal stenosis, 70% of the facet joints on the approach side left intact compared to 95% on the contralateral side.[30] Maximal preservation of facet joints is of paramount importance to restrain progression of post-operative spinal instability.[30] Hamasaki et al,[15] within a biomechanical study based on cadaveric human lumbar spine, stated that microendoscopic ULBD approach could leave the spine more than 80% as stiff as the maiden spine. No reoperations done which may be attributable to short period of follow-up.

Another worth-mentioning critical complication is epidural hematoma. Castro-Menéndez et al,[7] reported one patient of compressive epidural hematoma with resultant cauda equina syndrome necessitating urgent reoperation. No epidural hematomas were depicted in the current study which may be attributable meticulous hemostasis.

In line with Ikuta et al,[21] and Pao et al,[38] post-operative neural complications in form of transient dysesthesia were observed in 7.9% of patients however dysesthesia was mild and resolved gradually. The rationale of MEDL is to attempt maximal preservation the facet joint, bony anatomy, ligamentous structures and paravertebral muscles in order to maintain spinal stability; however fractures can occur to spinous process.[34] In this series, 0.5% of patients experienced asymptomatic intraoperative fracture of the spinous process.

This study was conducted upon large cohort reaching 583 patients however it has three main limitations: (1) No control cohort of wide laminectomy; the gold standard technique for LCS management (2) other indications for MEDL inclusive of degenerative spondylolisthesis and scoliosis were excluded (3) Follow-up period was too short which has a significant impact upon clinical outcome, complication rate as well as precise risk of post-operative instability.

Conclusion

The microendoscopic bilateral decompression via a unilateral approach is a minimally invasive novel procedure that yielded efficacious decompression in patients with degenerative single and multiple level LCS while maintaining spinal stability. It is associated with satisfactory clinical and functional outcomes, better patient satisfaction through minimizing hospital stay, ameliorating postoperative recovery. Moreover; it proved to be safe with minimal rate of complications that were comparable to the open wide laminectomy.

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الملخص العربي

رفع الضغط عن جانبين النخاع الشوكي بالفقرات القطنية من جانب أحادي بإستخدام المنظار في حالات تضيق القناة العصبية في مستوى واحد أو مستويات متعددة: سلسلة من 583 حالات

البيانات الخلفية: العلاج الجراحي التقليدي لمرضى تضيق القناة القطنية العصبية يتمثل في إستئصال الصفيحة العظمية الخلفية للفقرات مما يشمل إستئصال اجزاء واسعة من الهياكل الخلفية الداعمة للعمود الفقري القطني مثل الاربطة الخلفية للفقرة والشوكة العظمية وكذلك اجزاء واسعة من العظام الخلفية واحيانا المفاصل ايضا. وبالإضافة إلى ذلك، فهذا يتطلب عمل فتحة جراحية كبيرة في الجلد والعضلات وكافة الأنسجة . وتركز هذه الدراسة على النتيجة الإكلينيكية وفوائد رفع الضغط عن جانبين النخاع الشوكي بالفقرات القطنية من جانب أحادي بالمنظار في العلاج الجراحي للمرضى الذين يعانون من تضيق القناة العصبية القطنية في مستوى واحد أو أكثر.

الغرض: تهدف هذه الدراسة لوصف مؤشرات وأهمية وتطبيقات جراحة العمود الفقري بالمنظار في حالات ضيق القناة القطنية سواء مستوى واحد اومستويات متعددة. بالإضافة إلى ذلك، تسليط الضوء على الجوانب التشريحية الهامة لهذه التقنية وعرض الخبرات الجراحية والنتائج.

تصميم الدراسة: دراسة لحالات إكلينيكية بأثر رجعي

المرضى والطرق: من مايو 2008 إلى يناير 2016، تم علاج 583 مريضا متتاليين يعانون من تضيق القناة العصبية القطنية والذين ادرجوا في هذه الدراسة. وكانت الشكوى الرئيسية للمرضى عبارة عن آلالم وخذلان عصبي في الساقين بالإضافة إلى آلام الظهر والألم العصبي الوركي. تم إجراء إزالة الضغط عن النخاع الشوكي بالمنظار في مستوى واحد في 468 (80٪) حالة وفي مستويات متعددة في 115 (20٪) حالة. تم إجراء التصوير بالرنين المغناطيسي ، وبالاشعة المقطعية والأشعة السينية لجميع المرضى للتأكد من وجود أدلة على تضيق مركزي للقناة العصبية، ثم تكرر تلك الأشعات بعد عمل الجراحة. تمت متابعة جميع المرضى لمدة 3 أشهر على الأقل وجمع البيانات الخاصة بهم. تم تقييم النتائج الإكلينيكية والوظيفية بإستخدام مقياس التماثلية البصرية (VAS score) ومقياس جمعية العظام اليابانية الخاص بمرضى الفقرات القطنية (JOA score).

النتائج: بالمقارنة بالشكوى قبل الجراحة، كان هناك تحسن في آلام الظهر في 77 ٪ من المرضى وفي إشعاع الآلام في الساق في 86٪.، وفيما يتعلق بالنتائج الوظيفية كان متوسط النتيجة بحسب مقياس جمعية العظام اليابانية قبل الجراحة 14.9 وتحسنها بعد عمل الجراحة إلى 27.1. كان متوسط وقت الجراحة لكل مستوى 78 دقيقة، وكان متوسط فقدان الدم أثناء العملية لكل مستوى 18 مل. وشملت المضاعفات حدوث قطع في الأم الجافية في 27 (4.6٪) الحالات، الام عصبية واحساس غير طبيعيي بالعصب ولكن عابر بعى العملية الجراحية في 583/46 (7.9٪) من الحالات وعمل عظمي زائد في شكل إستئصال غير مقصود للمفصل الجانبي الاعلى في 583/38 (6.5٪) من الحالات وكسر في الشوكة العظمية الخلفية في 3 (0.5٪) الحالات.

الإستنتاج: تقنية رفع الضغط عن جانبين النخاع الشوكي بالفقرات القطنية من جانب أحادي بالمنظار هيا جراحة محدودة التدخل والتأثير على انسجة اسفل الظهر المختلفة، كما انها تبدو آمنة وفعالة في علاج تضيق العمود الفقري القطني سواء في مستوى واحد أو مستويات متعددة ، وقد صاحب ذلك نتائج اكلينيكية مواتية و كان مستوى رضا المرضى عن الجراحة التي اجريت لهم مرتفع.