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Transforaminal Lumbar Endoscopic Discectomy: A Novel Alternative for Management of Lumbar Disc Herniation in Patients With Rheumatoid Arthritis?

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Objective: Lumbar disc herniation (LDH) represents an increasingly encountered condition in patients with rheumatoid arthritis (RA). The aim of the present study is to assess the progress of health-related quality of life following transforaminal endoscopic lumbar discectomy (TELD) for LDH in patients suffering from RA.
Methods: Seventy-four patients, scheduled to undergo elective TELD for LDH, were prospectively enrolled in the study. Group A included 36 otherwise healthy individuals and group B 38 patients complementarily diagnosed with RA according to the 2010 ACR/EULAR (American College of Rheumatology/European League Against Rheumatism) criteria. The Medical Outcomes Study 36-item Short Form health survey (SF-36) was selected for the outcome assessment at baseline and postoperatively, at selected intervals at 6 weeks, 3, 6, and 12 months postoperatively.
Results: Group A presented statistically significantly higher scores in all SF-36 domains and all selected intervals ($p < 0.001$), except for mental health parameter. All aspects of SF-36 questionnaire significantly improved postoperatively ($p < 0.001$) and in each group independently. Nevertheless, the absolute improvement between consecutive time intervals did not differ significantly between the 2 groups.
Conclusion: Patients diagnosed with RA who undergo TELD for LDH demonstrate statistically significant improvement in their health status, as measured by SF-36 questionnaire, one year after the procedure. This improvement is comparable with normal individuals.

Keywords: Lumbar disc herniation, Rheumatoid arthritis, Minimally invasive spine surgery, Transforaminal endoscopic lumbar discectomy, Quality of life

INTRODUCTION

Rheumatoid arthritis (RA) is the most common systemic rheumatic disease.[1] Pathogenesis of the disease involves immune-mediated mechanisms that lead to synovitis and, subsequently, bone and cartilage erosions.[2] The disease mainly affects the musculoskeletal system, presenting commonly as symmetric polyarthritis, with a predilection for the small joints of the hands, especially the metatarsophalangeal joints.[1] Practically any joint that involves a synovial membrane can be affected during the natural course of the disease.

Musculoskeletal manifestations of RA may also involve the spine. Cervical spine, especially the upper vertebral levels, are commonly affected.[1,3] Cervical spine pathology is associated

with instability, atlantoaxial and subaxial subluxations, superior migration of the odontoid, intervertebral space narrowing and osteopenia.[1,3] Lumbar spine pathology is more frequent than initially thought to be in RA patients.[4] Common features include spondylitis, intervertebral space narrowing, endplate and facet joints erosions, compression fractures, osteoporosis, spinal canal stenosis and nerve root compression.[4,5]

Lumbar disc herniation (LDH) is a common spinal pathology at the age group between 30 and 50 years, featuring a slight predilection for males.[6,7] Lower lumbar levels (L4–5 and L5–S1) are involved in the vast majority of cases (95%).[6] The literature is lacking specific information about the prevalence of LDH in patients suffering from RA and, therefore, comparative data with the general population do not exist. However, low back pain is a common complaint in patients with RA (in about 30% to 50%), adversely affecting well-being and overall health regardless of the duration of disease, pharmaceutical treatment, or spinal surgery.[8,9]

Lumbar discectomy represents a frequently performed procedure in spinal surgery, demonstrating substantial evolvement from traditional open procedures to minimally invasive and full-endoscopic techniques in recent years.[10] Transforaminal endoscopic lumbar discectomy (TELD) represents a novel, full-endoscopic technique that is increasingly applied for surgical treatment of LDH. The herniated part of the disc is excised through a posterolateral approach via the neural foramen. The endoscope is inserted at the intervertebral level corresponding to disc pathology though the anatomic triangle firstly described by Kambin and Brager.[11] TELD is associated with minimal tissue trauma, reduced blood loss, reduced hospital stays and postoperative morbidity, demonstrating comparable effectiveness with gold standard open microdiscectomy according to existent evidence.[12]

The aim of the present study is to investigate the impact of TELD in patients with RA and LDH, in terms of health- related quality of life (HRQoL), further comparing results with these of otherwise healthy individuals who undergo TELD for LDH. No previous study has investigated the outcome of endoscopic lumbar spine surgery in this specific population, a fact that underlines originality of our study.

MATERIALS AND METHODS

1. Patients and Approvals

All aspects of this study are in strict accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki 1975 and its later amendments 2000) for experiments involving humans. In addition, this Manuscript is in line with the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals. All procedures related to this work were performed in compliance with relevant laws and institutional guidelines. Moreover, this study was approved by the Institutional Review Board of primary hospital (Interbalkan European Medical Center, Thessaloniki, Greece; approval number: 12.11.2015). All patients agreed to participate in the study, signing an informed written consent.

Patients recruited in this study were diagnosed with LDH, fulfilling criteria for surgical management. Patients with spinal stenosis, spondylolisthesis, vertebral fracture, or previous spinal surgery at the same or adjacent intervertebral levels were excluded from the present study.

2. Inclusion-Exclusion Criteria

Inclusion criteria were: (1) radiculopathy, (2) positive nerve root tension sign, (3) foraminal or paracentral LDH confirmed by magnetic resonance imaging of the lumbar spine, in compliance with clinical findings, (4) diagnosis and constant monitoring of an attending rheumatologist (in RA group) with documented stable activity of disease under standard antirheumatic regimen (with disease-modifying antirheumatic drugs – DMARDs) for at least 2 years,[13-15] (5) failure of 12-week conservative treatment (discontinuation of arduous physical activity, medication regimen, and physical therapy sessions with stable rheumatic disease status in RA patients).

Exclusion criteria were (1) sequestration of disc, (2) spinal stenosis, (3) recurrent herniated disc or previous surgery at the affected level, (4) segmental instability or spondylolisthesis, (5) spinal tumor or infection, and (6) vertebral fracture.

3. Methods

Seventy-four patients participated in the present prospectively designed study. The patients were divided in 2 distinct groups according to the diagnosis of RA. Patients with RA were diagnosed according to the 2010 ACR/EULAR (American College of Rheumatology/European League Against Rheumatism) criteria for classification, being treated with stable antirheumatic regimen under constant monitoring of the attending rheumatologist.[13] Group A included 36 patients (48.6%) with LDH without any concurrent signs of systemic rheumatic disease (RA or other related inflammatory disorders). Contrariwise, group B consisted of 38 patients (51.4%) that fulfilled the 2010 ACR/EULAR classification criteria for RA. The 2 groups did not dif-

Table 1. Baseline demographic and clinical characteristics of enrolled individuals

Characteristic	Group A	Group B	p-value
No. of patients	36 (48.6)	38 (51.4)	
Age (yr)	54.0 ± 8.3	54.4 ± 8.4	0.905
Male sex	19 (52.8)	18 (47.4)	0.642
Female sex	17 (47.2)	20 (52.6)	
Level of disc herniation			-
L3–4	13 (36.1)	13 (34.2)	
L4–5	17 (47.2)	16 (42.1)	
L5–S1	6 (16.7)	9 (23.7)	
Type of disc herniation			-
Paracentral	26 (72.2)	25 (65.7)	
Foraminal	10 (27.8)	13 (34.3)	
SF-36			
PF	56.0 ± 12.4	42.6 ± 15.8	< 0.001*
RP	46.9 ± 8.7	34.8 ± 14.1	< 0.001*
BP	36.0 ± 7.6	27.1 ± 8.7	< 0.001*
GH	50.6 ± 12.7	38.0 ± 12.1	< 0.001*
V	46.8 ± 11.0	31.3 ± 9.4	< 0.001*
SF	54.7 ± 11.3	43.8 ± 11.9	< 0.001*
RE	51.2 ± 9.6	38.6 ± 10.6	< 0.001*
MH	55.0 ± 14.0	54.4 ± 13.8	0.845

Values are presented as number (%) or mean ± standard deviation.
Group A, patients with lumbar disc herniation without any concurrent signs of systemic rheumatic disease (rheumatoid arthritis or other related inflammatory disorders); group B, patients that fulfilled the 2010 ACR/EULAR classification criteria for rheumatoid arthritis; SF-36, 36-item Short Form health survey; PF, physical functioning; RP, role limitations due to physical problems; BP, bodily pain; GH, general health perceptions; V, vitality, energy, fatigue; SF, social functioning; RE, role limitations due to emotional problems; MH, mental health.
*$p < 0.05$, statistically significant differences.

fer significantly in age and sex ratio. Baseline demographic characteristic of both groups is presented at Table 1.

4. Surgical Procedure

All patients were subjected to "outside-in" TELD, which was performed at the same tertiary center and by the same experienced spine surgeon (KS). The procedure was conducted under local anesthesia and mild sedation provided by the anesthesiologist. Furthermore, all steps of procedure were performed under constant fluoroscopic guidance. Patients were placed at the lateral decubitus position so that lesion was faced upwards and with hips and knees in flexion, in order to achieve maximal enlargement of affected foraminal space (Fig. 1). Ideal needle entry point, regarding distance from midline (being 11–13 cm in all cases), was determined according to preoperative T2-weighted axial images, which were meticulously reviewed in order to identify the distance from midline that led directly to lateral recess or foramen space, in the case of paracentral or foraminal LDH, respectively. This method was implemented in all patients, independently of other factors as obesity or presence of severe facet joints arthritis. Needle was orientated in a way to access the spinal canal through the intervertebral foramen in Kambin triangle.[11] Three different reamers of gradually increasing diameter were, subsequently, introduced through the foramen (5.5, 6.5, 7.5 mm), thus accomplishing foraminal decompression ("outside-in" technique). Finally, cannula and the endoscope were inserted and herniated part of the disc was excised with graspers, under direct visualization and until endoscopic visualization of nerve root pulsatility, indicative of satisfactory decompression (Fig. 2).

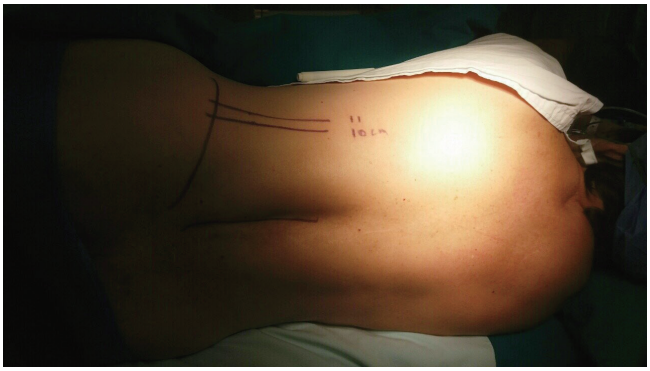

Fig. 1. Positioning of patients in lateral decubitus position and identification of needle entry point.

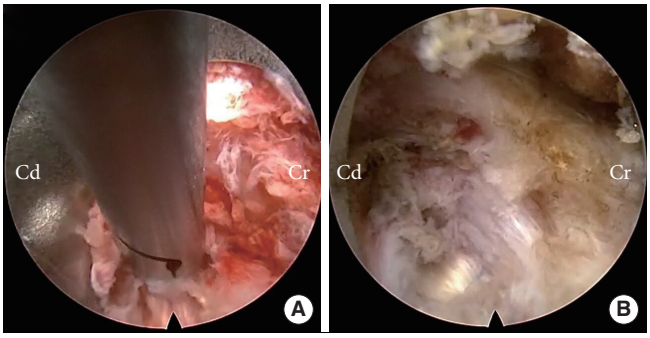

Fig. 2. Endoscopic visualization of initiation (A) and final result (B) during TELD for a left-sided L4–5 LDH. TELD, transforaminal endoscopic lumbar discectomy; LDH, lumbar disc herniation; Cd, caudal; Cr, cranial.

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5. Medical Outcomes Study 36-Item Short Form Health Survey

The Medical Outcomes Study 36-item Short Form health survey (SF-36) was used for outcome assessment in our study. SF-36 is a multipurpose, generic HRQoL instrument, constructed by multi-item scales and including several aspects of patient's life (general health, physical functioning, role limitations due to physical problems, bodily pain, general health perceptions, vitality, energy, and fatigue, social functioning, role limitations due to emotional problems, mental health). These aspects are considered to best evaluate the impact of disease or treatment on overall well-being and quality of life.[16] The score for its aspect ranges between 0 and 100, with higher scores representing higher quality of life. SF-36 has been translated in several languages. We used the SF-36 questionnaire that best applied to our population.[17]

6. Statistical Analysis

Statistical process of recorded data was conducted with IBM SPSS Statistics ver. 23.0 (IBM Co., Armonk, NY, USA). Continuous variables (as age and SF-36 aspect) were presented as mean ± standard deviation, whilst noncontinuous variables (as number of patients and sex), as percentages. Normality analysis was made by the use of Shapiro-Wilk test. Pearson (or chi-square test) was used for noncontinuous variables, while the Student t-test and the Mann-Whitney U-test for independent samples of continuous variables, with or without normal distribution, respectively. Level of statistical significance was determined at p-value = 0.05.

SF-36 aspects were measured preoperatively and postoperatively at selected intervals of 6 weeks and 3, 6, and 12 months, postoperatively. The results were analyzed to detect any significant differences between the 2 groups at each time interval. However, absolute interval changes were also studied.

RESULTS

All patients were successfully subjected to TELD for surgical excision of LDH, featuring no perioperative complications. Baseline SF-36 values are demonstrated at Table 1. Mean age was 54.0 ± 8.3 years for group A and 54.4 ± 8.4 for group B. The 2 groups did not differ significantly in age and sex ratio (Table 1).

Patients in group A scored significantly higher values in all SF-36 components and at all selected intervals ($p < 0.001$), except for mental health index. Specifically, group B presented with higher scores in mental health postoperatively at 6 weeks, 3, 6, and 12 months; however, difference was beyond the level

Table 2. SF-36 aspects' absolute changes between the selected intervals in the 2 groups

SF-36 components	Group A	Group B	p-value
PF			
Preoperative–6 wk	20.8 ± 8.7	23.1 ± 9.9	0.078
6 Wk–3 mo	2.1 ± 1.5	2.0 ± 1.2	0.205
3 Mo–6 mo	1.2 ± 0.5	1.3 ± 1.0	0.494
6 Mo–12 mo	1.2 ± 1.1	1.4 ± 1.2	0.945
RP			
Preoperative–6 wk	23.3 ± 4.7	25.8 ± 7.2	0.075
6 Wk–3 mo	1.9 ± 1.0	2.2 ± 1.0	0.205
3 Mo–6 mo	1.6 ± 1.2	1.6 ± 1.3	0.494
6 Mo–12 mo	1.4 ± 1.0	1.4 ± 1.1	0.945
BP			
Preoperative–6 wk	50.4 ± 6.2	50.0 ± 7.1	0.939
6 Wk–3 mo	2.0 ± 1.1	2.4 ± 1.3	0.119
3 Mo–6 mo	1.1 ± 0.7	1.3 ± 0.9	0.327
6 Mo–12 mo	1.3 ± 1.1	1.4 ± 1.0	0.424
GH			
Preoperative–6 wk	24.3 ± 1.0	25.6 ± 11.4	0.516
6 Wk–3 mo	2.1 ± 1.1	1.7 ± 1.0	0.175
3 Mo–6 mo	1.3 ± 1.1	1.4 ± 1.2	0.821
6 Mo–12 mo	1.5 ± 1.2	1.5 ± 1.1	0.863
V			
Preoperative–6 wk	26.3 ± 9.5	27.4 ± 8.1	0.661
6 Wk–3 mo	2.2 ± 1.1	2.1 ± 1.1	0.657
3 Mo–6 mo	1.4 ± 0.9	1.3 ± 0.9	0.444
6 Mo–12 mo	1.9 ± 1.3	1.9 ± 1.3	0.965
SF			
Preoperative–6 wk	18.9 ± 7.6	20.5 ± 8.0	0.488
6 Wk–3 mo	1.8 ± 1.2	1.8 ± 1.2	0.936
3 Mo–6 mo	1.0 ± 0.8	1.3 ± 0.9	0.159
6 Mo–12 mo	1.2 ± 0.9	1.8 ± 3.7	0.696
RE			
Preoperative–6 wk	22.7 ± 7.5	24.4 ± 8.8	0.558
6 Wk–3 mo	2.0 ± 1.1	1.9 ± 0.9	0.973
3 Mo–6 mo	1.4 ± 1.1	1.4 ± 0.9	0.933
6 Mo–12 mo	1.4 ± 1.2	1.4 ± 1.1	0.995
MH			
Preoperative–6 wk	19.6 ± 9.4	21.1 ± 10.5	0.481
6 Wk–3 mo	2.3 ± 1.6	2.1 ± 1.0	0.621
3 Mo–6 mo	1.1 ± 0.9	1.2 ± 0.9	0.635
6 Mo–12 mo	1.1 ± 0.9	1.2 ± 0.9	0.891

Values are presented as mean ± standard deviation.
Group A, patients with lumbar disc herniation without any concurrent signs of systemic rheumatic disease (rheumatoid arthritis or other related inflammatory disorders); group B, patients that fulfilled the 2010 ACR/EULAR classification criteria for rheumatoid arthritis; SF-36, 36-item Short Form health survey; PF, physical functioning; RP, role limitations due to physical problems; BP, bodily pain; GH, general health perceptions; V, vitality, energy, fatigue; SF, social functioning; RE, role limitations due to emotional problems; MH, mental health.
*$p < 0.05$, statistically significant differences.

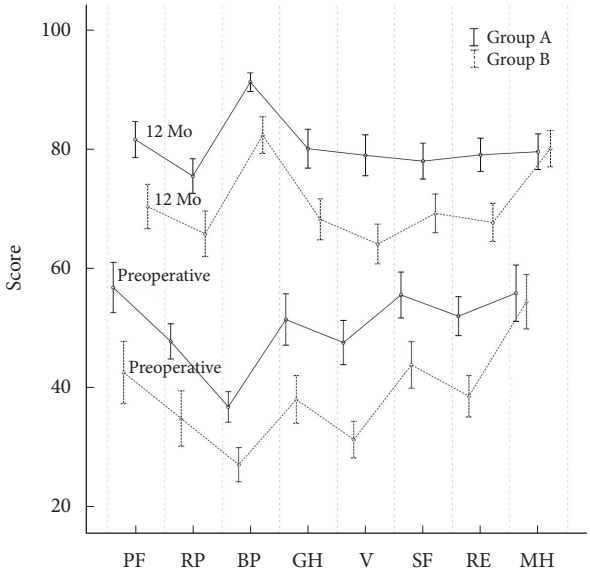

Fig. 3. SF-36 profile of evaluated patients at the preoperative setting and at the end of the follow-up period for both groups. Group A, patients with lumbar disc herniation without any concurrent signs of systemic rheumatic disease (rheumatoid arthritis or other related inflammatory disorders); group B, patients that fulfilled the 2010 ACR/EULAR classification criteria for rheumatoid arthritis; SF-36, 36-item Short Form health survey; PF, physical functioning; RP, role limitations due to physical problems; BP, bodily pain; GH, general health perceptions; V, vitality, energy, fatigue; SF, social functioning; RE, role limitations due to emotional problems; MH, mental health.

of statistical significance. The increase in all SF-36 components was statistically significant at all measured time intervals, compared to the immediately preceding measurements ($p < 0.001$), in each one of the groups independently.

Absolute changes between the different time-points for all SF-36 components are presented at Table 2, for both groups. Statistical analysis demonstrated that the absolute increase in all SF-36 components postoperatively did not present statistically significant differences between the 2 groups, at all measured intervals. The SF-36 profiles of patients at the preoperative setting and at the end of the follow-up period are presented at Fig. 3.

Furthermore, in RA group, rheumatologic status of enrolled individuals was not found to be modified, since all patients featured stable activity of disease with no requirement for antirheumatic regimen modification.

DISCUSSION

Health is a multivariate condition that includes several aspects of individual's life (physical, mental and social), rather than just the absence of illness.[18] In the past decades, HRQoL validated instruments have been introduced in the literature, both generic and condition-specific, as an endpoint measure to assess the natural course of chronic diseases or the outcome of different interventions and pharmaceutical therapies.[19] Disease-specific HRQoL tools, such as the Rheumatoid Arthritis Quality of Life Scale, the Health Assessment Questionnaire, or the Arthritis Impact Measurement Scale, have been rendered widely available in the literature.[20,21] These tools are designed to meet special needs of RA patients and detect substantial changes, related to treatment or natural progress of the disease, featuring higher sensitivity and responsiveness.[20]

The Medical Outcomes Study SF-36 constitutes the most commonly used generic HRQoL instrument in the literature.[22] SF-36 is a tool assessing overall health and well-being, broadly applied in the outcome assessment of spinal surgery due to its validity, responsiveness and reliability.[22,23] SF-36 is also applied in patients with RA, both in research and in clinical practice, tested for its reliability, validity and responsiveness.[21,24,25] The SF-36 domain of bodily pain is shown to be best responsive to health status changes, both improvement and deterioration, among other disease-specific questionnaires.[25] SF-36 offers a global estimation of assessed patients' quality of life, weighting factors that surpass the effect of disease-related variables on daily life, facilitating thus comparison of subjects in general population with these with miscellaneous chronic diseases.[21]

RA is a chronic disabling disease, associated with handicap, disability and high mortality.[2,26] RA has long-term effects on social life, working ability, emotional status and everyday functionality.[20] It has, also, multivariate socioeconomical impacts. Previous studies have reported the adverse effect of the burden of the disease on HRQoL and overall well-being. RA patients has been reported to demonstrate diminished scores in SF-36 questionnaire, especially in the domain of physical functioning, compared to normal population, independently from age and sex.[27]

Lumbar spine pathology and its negative impact on overall well-being and quality of life has been also shown by previous studies.[22,28] Patients diagnosed with LDH score considerably lower values in all SF-36 domains and especially in the physical components, compared to the general population.[22] Nevertheless, patients suffering from surgical lumbar spine conditions demonstrate a worse profile in all SF-36 components, when compared to patients with RA, except for the domain of general health.[22,29] Normative data concerning the specific values of SF-36 in patients simultaneously diagnosed with RA and LDH

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are not provided in the literature. From the existing data, however, we can assume a potential cumulative negative effect of both conditions on HRQoL.

Outcome of lumbar spine surgery in patients with RA has not been extensively reported. Existing data by Crawford et al.[4] reported increased complication rates in RA patients who underwent open lumbar surgery for spinal stenosis. These complications were mainly surgical site infections and implant complications, attributed to disease or drug-related immunosuppression and osteopenia. Open procedures are associated with higher incidence of infections, either surgical site or other, which in this group of immunosuppressed patients may be of vital significance in comparison with endoscopy.[12,30] Our hypothesis is that full-endoscopic lumbar spine surgery is associated with theoretical benefits in patients with RA.

In the present study, we intended to quantify the potential benefit of TELD for LDH in the postoperative quality of life in RA patients and compare the results with otherwise healthy individuals, subjected to the same procedure. We used the SF-36 questionnaire for the assessment of surgical outcome.

Previous studies have demonstrated the beneficial impact of lumbar spine endoscopy on HRQoL, measured by the SF-36 questionnaire. Peng et al.[31,32] conducted a prospective study, showing that all aspects of SF-36 significantly improve at 6 months and 2 years after TELD, apart from the domain of general health. In our study, all aspects of SF-36 depicted a significant amelioration after 1 year postoperatively, in both subgroups of otherwise healthy and rheumatic patients. This improvement was statistically significant between all the selected time intervals and for both groups. Specifically, the beneficial impact of TELD on HRQoL was already evident from the first postoperative measurement at 6 weeks, exhibiting a gradual increase until the end of the follow-up at 12 months. Moreover, our results suggested that postoperative absolute interval changes in all measured domains of SF-36 did not differ significantly between the 2 groups, advocating for the beneficial role of technique in HRQoL of all patients. Comparative analysis revealed that bodily pain domain presented the greatest improvement postoperatively, in both groups. However, even the mental components of the questionnaire demonstrated significant postoperative improvement.

Patients with RA suffer from chronic pharmacoresistant low back pain due to multifactorial inflammatory disorder which affects bones, ligaments, and fibrocartilaginous structures (as intervertebral disc).[33] Lumbar facet joints are also majorly affected in these patients, contributing in lumbar spinal instability. Furthermore, RA patients are in increased risk of surgical site infection in comparison with general population, a fact that frequently determines treatment selection.[34] For these reasons and considering also that chronic inflammation leads to fibrosis, it is important to utilize minimally invasive surgical techniques (as TELD) instead of open (as microdiscectomy) to minimize tissue trauma and postoperative epidural scarring, which may be unfavorably associated with neural impingement and clinically recurrence of radiculopathy. Moreover, the reduced skin incision in conjunction with constant irrigation of epidural space minimized surgical wound infection in these immunosuppressed individuals. Last but not least, TELD has minimal effect on physiologic biomechanical status of lumbar spine by preserving osseous, muscular and ligamentous structures, being thus a beneficial alternative for patients with RA, who, are inherently prone to development of spinal instability.[33-35]

Technically speaking, performance of TELD for surgical management of LDH features remarkable differences in patients suffering from RA, in contrast to their otherwise healthy counterparts. RA leads to progressive chronic inflammatory facet joint arthritis, which is always present in these patients.[34] Hence, foraminoplasty via reaming may be arduous in selected cases, increasing the risk for exiting nerve root or dorsal root ganglion damage during indirect decompression. In conjunction, the concurrent presence of osteopenia in these patients may also increase the risk of neural damage due to reamers or working channel displacement. Considering aforementioned characteristics, conduction of technique under constant fluoroscopic guidance with gentle maneuvers during sequential introduction of reamers and working channel represent, to our point of view, principles of critical importance for minimizing of associated complications.

Regarding complications, dorsal root ganglion irritation represents a known complication of TELD, being unfavorably associated with transient dysesthesia at exiting nerve root distribution. This complication is consistently reported by several scholars.[36,37] As mentioned above, inflammatory arthritis of facet joints in RA patients may increase the risk of this complication, considering the comparatively narrower foraminal area, despite that this was not observed in our investigation. To avoid this complication, it is crucial that technique is conducted under constant fluoroscopic guidance, initially targeting the needle in posterior edge of superior endplate of underlying vertebra in lower foraminal area. Except for this principle that was strictly applied in our study, there has been much effort towards development of technical TELD modifications in order to minimize dorsal root ganglion damage in recent years.[36,37]

Our findings are consistent with our primary hypothesis that lumbar spine endoscopy may be beneficial for the specific population of RA patients, whose quality of life is already undermined by the burden of the rheumatic disease. No previous data are available in the literature regarding the outcome of lumbar spine endoscopy in patients with RA. TELD accesses the disc pathology through the neural foramen sparing the paraspinal muscles, ligamentous and osseous structures and being associated with diminished blood loss, hospitalization times, postoperative morbidity and working disability period, the latter of critical importance for RA patients. TELD seems to have significant advantages regarding traumatization, perceived postoperative back pain and postoperative rehabilitation period.[12] Regarding the comparatively higher incidence of complications of open lumbar spine surgery in those patients, full-endoscopic techniques should be considered as a beneficial alternative.[4]

Despite the recorded favorable outcomes of TELD in patients with RA and concurrent LDH in our study, it is important to mention that delineation and quantification of pure outcome of performed interventions in these patients represents a challenge, considering the burden of underlying disease. In our study, we selected to include RA patients with constant monitoring of an attending rheumatologist and documented stable activity of disease under standard antirheumatic regimen with DMARDs for at least 2 years, a fact that is underlined from recent relevant guidelines.[13-15] Furthermore, rheumatic status of enrolled individuals was not depicted to alter until the end of follow-up, which advocates for the favorable role of TELD in these patients. Minimization of confounding factors in these patients is of crucial importance to precisely delineate role of performed interventions. This procedure should be carefully performed by strict adherence to relevant guidelines, since activity and severity of disease has been associated with postoperative deterioration and need for reoperation in lumbar disc surgery.[38] These points should be considered from researchers in the field for future studies and more data is required to precisely determine the potential confounders in these patients.

Considering our study characteristics in the general literature framework with absolute absence of relative data, we believe our results should be interpreted with caution in the concurrent context of specific limitations. First, sample size may be considered limited in this study, as this was an early analysis of our series in a single-center setting. Second, follow-up duration was also limited, being not exclusively capable of elucidating the precise effects of technique on quality of life in a mid- and long-term period. Third, clinical comparison of RA patients with otherwise healthy individuals may be initially confusing; however, after our repetitive clinical observations of positive TELD effects in these patients during daily routine setting, we desired to investigate the effects of technique in these frail individuals in comparison with otherwise healthy counterparts, finding that ameliorative character of TELD was equally manifested in both groups. Fourth, it is important to mention that, regarding subjective recording of pain, only bodily pain index of SF-36 was utilized in this study. Hence, degree of representation of overall pain by low back pain—as a result of underlying inflammatory facet joint arthritis—in conjunction with radicular pain—as a result of LDH—was not potential to be precisely determined, a point that may be useful for future studies in the field. To our point of view, all these limitations are attributed to the fact that we endeavored to provide our early experience with conduction of technique in these patients in an initially limited series analysis, considering the absolute absence of relative studies in the literature. Nevertheless, we also believe that our results regarding beneficial impact of TELD in RA patients are particularly encouraging, necessitating further investigations from further well-designed clinical trials with larger sample sizes, more extended follow-up intervals and more multiparametric analysis in order to minimize confounders and increase reliability of results.

CONCLUSION

Results of our study exhibited that conduction of TELD in patients with RA is associated with a substantial amelioration of all measured parameters of SF-36 until the end of follow-up period at 1 year, indicating the beneficial role of technique in these frail patients. Furthermore, postoperative progress in quality of life was depicted to be equal compared to otherwise healthy individuals during the studied follow-up intervals. Hence, we conclude that TELD represents a safe and effective alternative for surgical treatment of LDH in patients with RA, which deserved further investigation from further studies.

NOTES

Conflict of Interest: The authors have nothing to disclose.

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NG; Funding acquisition: SK, CC, PT, NG; Methodology: SK, CC, PT, NG; Project administration: SK, CC, PT, NG; Visualization: SK, CC, PT, NG; Writing – original draft: SK, CC, PT, NG; Writing – review & editing: SK, CC, PT, NG.

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