

Radiological characteristics and surgical requirements of patients with and without rheumatoid arthritis with low back pain: a multicenter study

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ABSTRACT

Objective: Rheumatoid arthritis is a common chronic inflammatory disease that causes deformation and structural damage. Although cervical involvement is more common in the spine, lumbar involvement can also be seen.

Material and Methods: The data of the patients in the groups with and without rheumatoid arthritis who were followed up for low back pain in the last 5 years in 3 central hospitals in the study were obtained by retrospectively scanning the database.

Results: In our study, which was performed on 132 patient data, it was observed that there was no statistically significant difference between the groups in terms of radiological characteristics. No significant difference was observed in terms of surgical results.

Conclusion: Although radiologically different features were added due to rheumatoid arthritis, it was observed that it did not affect the surgical results and complications.

Keywords: Rheumatoid arthritis, low back pain, lumbar stabilization, facet arthritis, spondylolisthesis

INTRODUCTION

Rheumatoid arthritis (RA) is a common rheumatic inflammatory disease characterized by polyarticular synovitis that can cause deformation and structural damage. [1] The disease usually affects the spine. However, a study showed that 24% of patients with RA had low back pain. [2] In fact, some studies have reported this rate to be 33%-66%. [3] Because the lumbar facet joint is a synovium and stabilizes the lumbar spine, RA synovitis may cause lumbar instability and spondylolisthesis (SPL) through facet arthritis. Previous studies have shown that RA can affect the lumbar spine with erosion. [4]

Although disc narrowing without osteophyte formation is more common in patients with RA, radiological outcomes such as spondylolisthesis and facet joint erosions were not significantly different when compared to other groups without RA. It was also concluded that osteoporosis is more common in patients with RA. [5] Crawford et al. In a study that compared the results of lumbar fusion between 19 patients with RA and 19 patients without RA, very satisfactory results were obtained in 74% of patients with RA and 63% of patients without RA. [6]

Although there are widely published series of results after cervical fusion in patients with rheumatoid arthritis, not many studies, have been reported on the lumbar radiological characteristics of patients with RA and the outcomes of patients undergoing lumbar spinal surgery. In our study, we conducted a study to compare the radiological features of our patients with and without RA, and the clinical results of patients who underwent lumbar surgery.

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MATERIAL and METHODS

This study was conducted by collecting the data of patients with low back pain with and without rheumatoid arthritis in different hospitals in Turkey (Meram Medical Faculty Rheumatology; USA, Van Yüzüncü Yıl University; Physical Therapy and Rehabilitation, SBU Haydarpaşa Training and Research Hospital), who have been followed up and treated in physical therapy and rheumatology outpatient clinics for the last 5 years. The Van Yüzüncü Yıl University Ethics Committee approved this retrospective multicenter study.

After the approval of the ethics committee of this study, the data of 132 patients aged 18-100 years were collected by scanning the radiological and clinical information of the patients with and without rheumatoid arthritis, who applied to the physical therapy outpatient clinic of our hospital due to low back pain, retrospectively, through the Enlyl HBYS system of the Yüzüncü Yıl University, Faculty of Medicine Hospital. Among these collected individuals; Radiological characteristics of the lumbar disc such as modic type degeneration stage, Schmorl nodules, presence of spinal stenosis, annulus fibrosis tear, disc herniation type, ligamentum flavum hypertrophy, loss of lumbar lordosis, demographic characteristics such as patients' age, gender, comorbidity, smoking, and Erythrocyte Sedimentation Laboratory data such as rate (ESR), C-reactive protein (CRP), Anti-Cyclic Citrullinated Peptide (Anti-CCP), Rheumatoid Factor (RF) were examined.

Surgical requirements of patients with and without rheumatoid arthritis, what type of surgery was performed, complications after surgery and what kind of complications were encountered were collected.

Statistical method: Mean, standard deviation, median lowest, highest, frequency and ratio values were used in the descriptive statistics of the data. The distribution of variables was measured with the Kolmogorov-Smirnov test. The Mann-Whitney U test was used in the analysis of quantitative independent data. Chi-square test was used to analyse qualitative independent data, and Fischer test was used when the chi-square test conditions were not met. SPSS 28.0 program was used in the analysis.

RESULTS

The age of the patients in the group with rheumatoid arthritis was significantly ($p < 0.05$) higher than the group without rheumatoid arthritis. Gender distribution did not differ significantly ($p > 0.05$) between the groups with and without rheumatoid arthritis. The smoking rate did not differ significantly between the group with and without rheumatoid arthritis ($p > 0.05$). Disc Density ratio did not differ significantly ($p > 0.05$) between the group with and without rheumatoid arthritis. The MODIC ratio did not differ significantly ($p > 0.05$) between the group with and without rheumatoid arthritis. Annulus Fibrosus Tear rate did not differ significantly ($p > 0.05$) between the group with and without rheumatoid arthritis. The Bulging, Protrusion, Extrusion, and Sequestration rate did not differ significantly ($p > 0.05$) between the group with and without rheumatoid arthritis. Schmorl's Nodules in the group with rheumatoid arthritis rate was significantly higher than the group without rheumatoid arthritis ($p < 0.05$). The rate of stenosis in the group with rheumatoid arthritis was significantly ($p < 0.05$) higher than the group without rheumatoid arthritis. ESR, CRP values in the group with rheumatoid arthritis were significantly higher ($p < 0.05$) than in the group without rheumatoid arthritis. Low Back Pain Duration did not differ significantly ($p > 0.05$) between the group with and without rheumatoid arthritis. The ratio of Ligamentum Flavum Hypertrophy did not differ significantly ($p > 0.05$) between the group with and without rheumatoid arthritis. $p < 0.05$ was higher. The comorbidity rate in the group with rheumatoid arthritis was significantly ($p < 0.05$) higher than the group without rheumatoid arthritis. The rate of need for surgery did not differ significantly ($p > 0.05$) between the group with and without rheumatoid arthritis. The Post-Surgical Complication rate did not differ significantly ($p > 0.05$) between the group with and without rheumatoid arthritis. (Table 3)

Table 1: Demographic properties of the participants

		Min-Max	Median	Avg.±ss/n-%
Age		25.0 - 74.0	54.0	52.0 ± 10.4
Gender	Male			21 15.9%
	Female			111 84.1%
Tobacco Use	Yes			50 37.9%
	No			82 62.1%
Accompanying Disease	Yes			51 38.6%
	No			81 61.4%
Accompanying Disease	Anxiety			4 3.0%
	Asthma			3 2.3%
	BPH			1 0.8%
	DM			10 7.6%
	GUT			1 0.8%
	Hyperthyroid			1 0.8%
	Hypothyroid			4 3.0%
	HT			25 18.9%
	KAH			1 0.8%
	KOAH			1 0.8%
	Compression Fracture			2 1.5%
Disc Density	OP			9 6.8%
	Diminished			132 100.0%
MODIC	No			33 25.0%
	Type I			11 8.3%
	Type II			68 51.5%
	Type III			20 15.2%
Annulus Fibrosus Rupture	Yes			98 74.2%
	No			34 25.8%
Hernia	Bulging			45 34.1%
	Protrusion			72 54.5%
	Extrusion			12 9.1%
	Sequestration			3 2.3%
Schmorl Nodules	Yes			58 43.9%
	No			74 56.1%
Stenosis	Yes			28 21.2%
	No			104 78.8%

Table 2: Patient data and statistics

		Min-Max	Median	Avg.±ss/n-%
ESR		2.0 - 86.0	13.0	17.2 ± 13.9
CRP		2.0 - 98.0	3.0	9.8 ± 15.6
Anti-CCP		5.0 - 1000	113.5	214.7 ± 224.8
RF		9.0 - 2200	66.5	179.7 ± 330.2
Das 28 score		1.5 - 207.0	2.8	8.8 ± 34.1
RA Time		1.0 - 25.0	7.0	8.0 ± 4.6
Low Back Pain Duration		0.5 - 15.0	4.0	4.5 ± 2.8
Ligamentum Flavum Hypertrophies	Yes			50 37.9%
	No			82 62.1%
Loss of Lordosis	Yes			49 37.1%
	No			83 62.9%
Das 28	Remission			23 17.4%
	Low Patient Act.			29 22.0%
	Moderate Patient Act.			13 9.8%
	High Patient Act.			4 3.0%
	No Information			2 1.5%
Biological Treatment	Yes			31 23.5%
	No			40 30.3%
Surgical Requirement	No			90 68.2%
	Yes			42 31.8%
Type of Surgery	<i>l2-s1 Laminectomy</i>			1 0.8%
	<i>L3-4 Laminectomy</i>			2 1.5%
	<i>l4-5 Laminectomy and Stabilization</i>			1 0.8%
	<i>l4-5 Laminectomy</i>			3 2.3%
	<i>L4-5 Laminectomy</i>			4 3.0%
	<i>L4-5 Micro-disc. L4 Laminectomy</i>			1 0.8%
	<i>L5-S1 Laminectomy</i>			1 0.8%
	<i>Laminectomy</i>			2 1.5%
	<i>Laminectomy. Post Segmental Instrumentation</i>			1 0.8%
	Post-Surgical Complication	No		
Yes				7 5.3%
Post-Surgical Complication	<i>Abscess</i>			1 0.8%
	<i>Grade 1 Anterolisthesis</i>			1 0.8%
	<i>L3 Grade 1 Anterolisthesis</i>			1 0.8%
	<i>Pathologic Fracture Listhesis</i>			1 0.8%
	<i>Left Lower Extremity Monoparesis</i>			1 0.8%
	<i>Spondylodiscitis</i>			1 0.8%
	<i>Loosening of Stabilization Material</i>			1 0.8%

Table 3: Surgical requirements of patients with and without rheumatoid arthritis with low back pain

		Rheumatoid Arthritis (+)		Rheumatoid Arthritis (-)		P
		Avg.±ss/n-%	Median	Avg.±ss/n-%	Median	
Age		54.3 ± 10.4	57.0	49.3 ± 9.8	49.0	0.004 m
Gender	Male	10	14.1%	11	18.0%	0.536 X ²
	Female	61	85.9%	50	82.0%	
Tobacco Use	Yes	28	39.4%	22	36.1%	0.691 X ²
	No	43	60.6%	39	63.9%	
Disc Density	Diminished	71	100%	61	100%	1.000 X ²
MODIC						
No		16	22.5%	17	27.9%	0.490 X ²
Type I		8	11.3%	3	4.9%	
Type II		35	49.3%	33	54.1%	
Type III		12	16.9%	8	13.1%	
Annulus Fibrosus Rupture	Yes	57	80.3%	41	67.2%	0.087 X ²
	No	14	19.7%	20	32.8%	
Hernia						
Bulging		19	26.8%	26	42.6%	0.083 X ²
Protrusion		42	59.2%	30	49.2%	0.331 X ²
Extrusion		8	11.3%	4	6.6%	0.525 X ²
Sequestrectomy		2	2.8%	1	1.6%	1.000 X ²
Schmorl Nodules	Yes	38	53.5%	20	32.8%	0.017 X ²
	No	33	46.5%	41	67.2%	
Stenosis	Yes	21	29.6%	7	11.5%	0.011 X ²
	No	50	70.4%	54	88.5%	
ESR		23.1 ± 16.3	18.0	10.4 ± 5.0	10.0	0.000 m
CRP		12.6 ± 17.3	7.0	6.2 ± 12.4	2.0	0.001 m
Low Back Pain Duration		4.3 ± 2.3	4.0	4.7 ± 3.2	4.0	0.722 m
Ligamentum Flavum Hypertrophies	Yes	31	43.7%	19	31.1%	0.139 X ²
	No	40	56.3%	42	68.9%	
Loss of Lordosis	Yes	35	49.3%	14	23.0%	0.002 X ²
	No	36	50.7%	47	77.0%	
Accompanying Disease	Yes	40	56.3%	11	18.0%	0.000 X ²
	No	31	43.7%	50	82.0%	
Surgical Requirement	Yes	46	64.8%	44	72.1%	0.367 X ²
	No	25	35.2%	17	27.9%	
Post-Surgical Complication	Yes	68	95.8%	57	93.4%	0.551 X ²
	No	3	4.2%	4	6.6%	

^m Mann-Whitney u test / ^{X²} Chi-square test

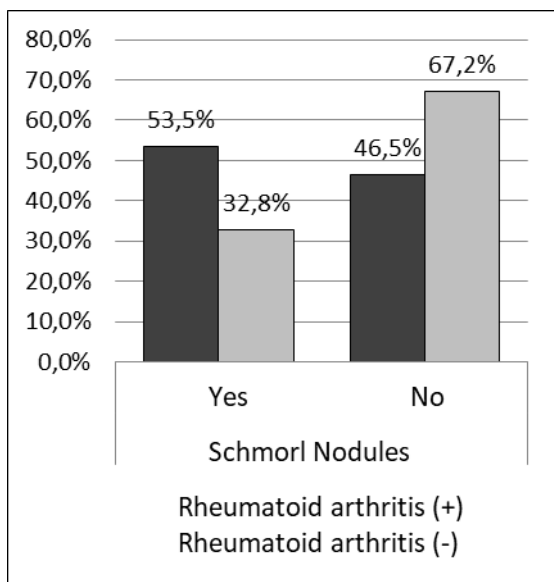


Figure 1: Comparison of Schmorl Nodules between groups

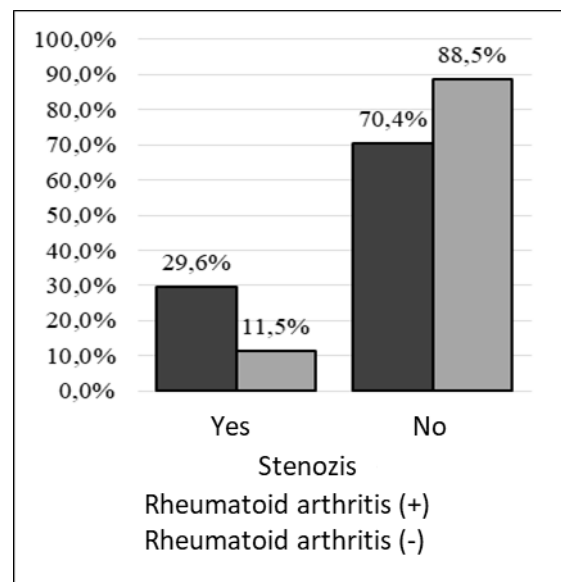


Figure 2: Spinal stenosis differences between groups

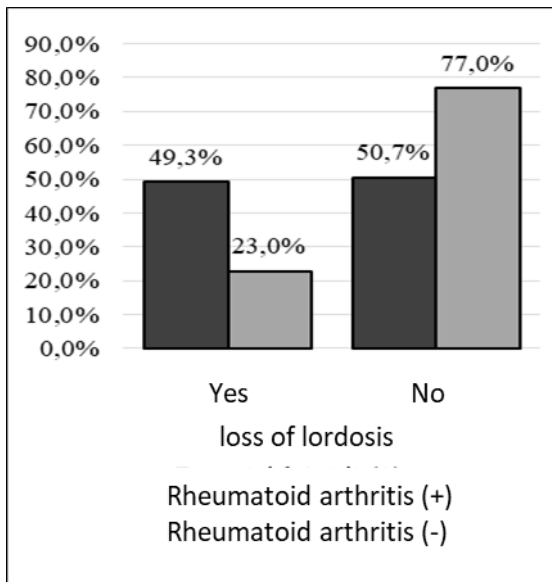


Figure 3: Comparison of lordosis loss between groups

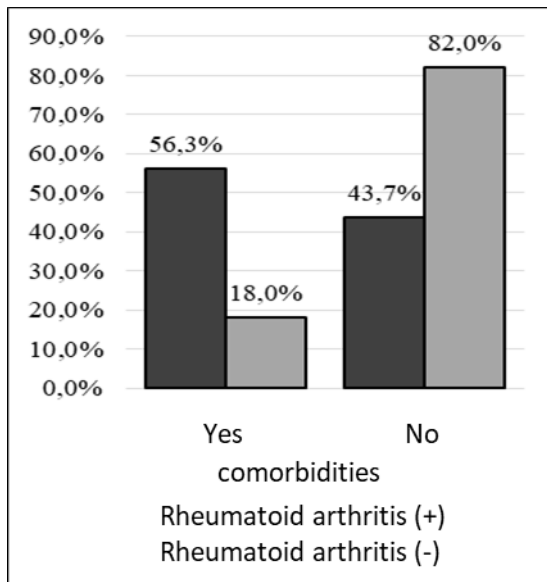


Figure 4: Comparison of accompanying disease rates between groups

DISCUSSION

Rheumatoid arthritis is an autoimmune disorder in which rheumatoid factor is frequently detected in the blood. The most important characteristic feature of the disease is suffering from an inflammatory arthropathy of the diarthrodial joints. [7] The manifestation of the disease in the spine is usually the destruction of the facet joints along with the disc space. Current medical treatment provides relief of clinical symptoms. Patients are generally relieved by oral steroids and disease-modifying antirheumatic drugs, which are used less frequently during acute exacerbations. Patients may evolve to adverse outcomes such as osteoporosis and immunodeficiency as a result of the effects of the disease and the drugs used. [8]

The spine surgery literature contains many publications on cervical spine pathologies seen in patients with rheumatoid arthritis. Kim and Hilibrand described the pathology seen in RA as atlantoaxial subluxation, atlantoaxial impaction and subaxial subluxation. Symptomatic patients with persistent pain or neurologic deficits should be treated surgically with decompression and fusion. [9] Osteopenia may cause difficulties in instrumentation. Risks are also fusion defects and the development of recurrent instability. Current perioperative mortality is reported as 5-10%. [10]

There is insufficient data in the literature on the lumbar spine in rheumatoid arthritis. Pathologies of the spine include spondylitis, degenerative scoliosis, degenerative spondylolisthesis, disc space narrowing, endplate erosion (associated with clinical symptoms), facet erosion, and cyst formation. Severe osteoporosis can lead to compression fractures. In advanced cases, canal stenosis including cauda equina and paraplegia has been reported. [11]

In a study reporting that seven patients with lumbar spine pathologies were treated with decompression and posterior fusion, it was reported that gait improved and back and leg pain decreased.

Collapse of the adjacent vertebra, instability of the adjacent segment, displacement of the pedicle screw and infection were the complications that were reported with a high rate. [12]

In our study, it is seen that the age of patients with RA is higher than the age of patients without RA. The age difference is also consistent with the literature. In our study, it was observed that there was no difference in terms of gender and smoking. No difference was observed in disc density and Modic type degeneration types between the two groups.

In our study, it was determined that there was no statistically significant difference in terms of disc characteristics and annulus fibrosus tears obtained from lumbar MRIs of the patients. In terms of Schmorl's nodules, it was observed that it was more common in the group with RA. The fact that Schmorl's nodules are more common in the RA group suggests that it is a new finding in the literature. This is because no definitive finding regarding the etiology of Schmorl's nodules was found in large-scale reviews in the literature. [13]

In our study, it was observed that the rate of spinal stenosis was higher in the RA group compared to the other group, which is a result consistent with the literature. Lumbar canal stenosis in RA is not only related to degeneration, but also to facet arthritis and inflammation around the vertebral endplate. [14]

It is expected that ESR and CRP values are higher in the group with rheumatoid arthritis than in the group without rheumatoid arthritis. The elevation of acute phase reactants (ESR and CRP) indicates that activity continues in patients with RA. [15]

Although there was no significant difference between the groups in hypertrophy of the ligamentum flavum, we found that patients with RA had a higher loss of lumbar lordosis. It

has been reported that the combination of degenerative changes in patients with rheumatoid arthritis caused spinal deformity, including loss of lumbar lordosis and degenerative scoliosis, in 28% of the patients. [16]

We think that the higher rate of additional disease in the RA patient group in our study is due to the high age curve of this group and its association with chronic diseases. In the rheumatoid arthritis group, there was no difference with the other group in terms of complications in patients who needed surgery and underwent surgery. The absence of this difference may also be due to the small number of patients participating in the study.

The results of this study suggest that patients with RA who undergo lumbar spinal surgery can expect similar clinical outcomes and complication rates compared to patients without RA who undergo the same procedure.

CONCLUSION

Rheumatoid arthritis is a serious systemic disorder that many spine surgeons have hesitations about in the surgical approach due to the patient's comorbidities. Evaluation of patients has turned into an advantage at the threshold of today's technological opportunities and the results of many scientific studies. In our study, although the radiological characteristics of rheumatoid arthritis patients were different from the non-rheumatoid arthritis group in terms of lumbar region pathologies, they had similar clinical features in terms of spinal surgery results.

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Author Contributions: EÇ, Sİ, SP: Research concept and design, collection and/or assembly of data, data analysis and interpretation, writing the article, critical revision of the article, final approval of article.

Ethical approval: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and/or with the Helsinki Declaration of 1964 and later versions.

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