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Middle-term therapeutic effect of the sacroiliac joint blockade in patients with lumbosacral fusion-related sacroiliac pain

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Objective: The aim of this study was to compare the therapeutic effect of sacroiliac (SI) blockade in patients with and without lumbosacral fusion.

Methods: This study included 72 patients diagnosed with SI pain and who received blockade injection (methylprednisolone and lidocaine). Patients were divided into 2 groups; 22 patients in the fusion group who underwent previous lumbosacral fusion and 50 patients in the non-fusion group. Average follow-up was 17.7 (range: 6 to 30) months. All patients were evaluated before and after intervention using the Visual Analog Scale (VAS), Oswestry Disability Index, Rivermead Mobility Index and SF-36. Results were statistically analyzed.

Results: Activity pain (a component of VAS) was significantly better in the non-fusion group than the fusion group ($p=0.042$). No other statistically significant differences were observed between groups ($p>0.05$).

Conclusion: Sacroiliac blockade has a similar therapeutic effect on patients who underwent lumbosacral fusion surgery as on non-operated patients in the middle-term. Therefore, alternative treatment options are not necessary in patients with fusion.

Key words: Injection; lumbosacral fusion; pain; sacroiliac joint.

Spinal instrumentation and fusion is a surgical intervention that changes the biomechanics of the spine and load distribution. Therefore, 'adjacent segment degeneration' has gradually become more popular. Adjacent segment degeneration caused by excessive stress formed at the inferior and superior part of the rigid segment impairs the success of the original operation and frequently requires treatment. Distal adjacent level is accepted as the sacroiliac (SI) joint in the presence of a fusion terminated in the lower lumbar part.[1] Sacroiliac joint degeneration is considered responsible for new onset of posterior pain developing after spinal fusion operation.[2] Sacroiliac problems are more often seen when the sacrum is involved in the fusion.[1,3,4]

The effectiveness of injection treatments is controversial in SI pain. A review of literature data reveals little evidence of the effectiveness of corticosteroid injections.[5] However, injections continue to be used due to the absence of a clear consensus about different SI joint treatments and their less invasive nature.[6]

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The aim of this study was to compare the results of corticosteroid injection for the treatment of SI pain between patients who underwent lumbosacral fusion surgery and those who did not.

Patients and methods

Approval for this prospective study was obtained from the ethics committee of our institution. The study included 112 patients diagnosed with SI pain and who responded positively to SI injection between 2009 and 2012. Diagnosis of SI pain was determined by either arthrotic findings on X-rays or through positive sacral and pelvic compression tests. Of the 112 patients, 22 had previously undergone lumbar spinal fusion surgery. Positive response to SI injection was considered a 75% or greater reduction in pain prompted by compression testing 1 to 8 hours following injection.[7] Patients with syndromes, neuromuscular diseases, history of spondyloarthropathy, decompensated metabolic diseases, history of coagulopathy, allergy to medications and pregnant patients were excluded from the study. Patients whose fusion was terminated above the sacrum were not included in the fusion group. Twenty-eight patients were excluded from the study as they did not complete the follow-up and 12 patients were excluded as they tried different therapies after the injection.

The remaining 72 patients were enrolled in the study as two groups. The fusion group comprised the 22 patients who underwent previous spinal fusion surgery and the non-fusion group the 50 non-operated patients (Fig. 1).

Patients were informed about the process and potential complications and their written consent was obtained. With the patient in the prone position, the estimated access point was marked on the skin through observation of the inferior part of the SI joint. Injection was performed from the standard entrance portal under fluoroscopy guidance. A 22-gauge spinal needle was advanced to the joint space parallel to the angle of the C-arm from the access point marked on the skin. 0.5 cc of non-ionic contrast medium was injected into joint space in order to verify the position after the joint capsule was passed. Blockade was applied with 1 cc of methylprednisolone (Depo-medrol®; Eczacıbaşı, Turkey) and 1 cc of lidocaine HCI (Lidokaine®-ER; Vem İlaç, Turkey).[8]

Age, gender, height, weight and educational status of the patients were recorded. Patients were followed up at 6 month intervals for a mean of 17.7 months.

Pain was evaluated using the Visual Analog Scale (VAS). Patients were informed about the use of the pain assessment scale (0=no pain, 5=moderate pain, 10=extremely severe pain) and asked to indicate the pain level felt during sleep, rest, activity (walking) on the scale.[9]

The Oswestry Disability Index (ODI) was used to determine the pain-related disability level. The questionnaire is composed of 10 subgroups inquiring severity of pain, self-care, lifting-carrying, walking, sitting, standing, sleep, sexual life, travelling and social life. Total scores vary between 0 and 50 and the level of disability increases as the score increases.[10]

The Rivermead Mobility Index (RMI) was used to evaluate patient mobility level. The RMI is a uni-dimensional index composed of basic mobility activities and focused on measuring mobility status. The self-report index is composed of 14 questions and 1 observation including activities ranging in difficulty from turning in

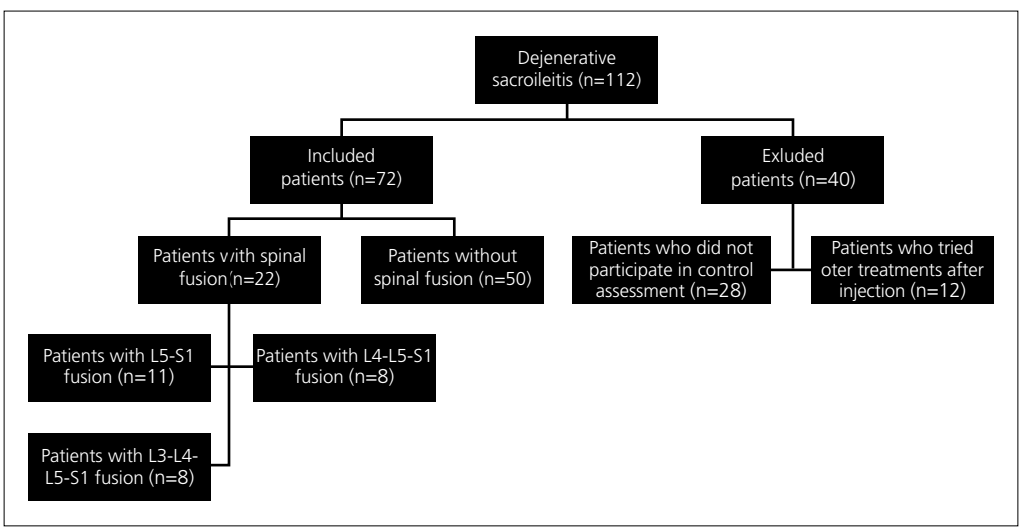

Fig. 1. Distribution of the patients who were included in the study and followed up.

bed to running. Answers of "yes" are awarded 1 point. Scores of 15 points indicate no mobility problem and scores of 14 and below indicate mobility problem.[11]

Functional level of the cases was evaluated with the 24-item Roland-Morris Disability Questionnaire (RMDQ). Total scores were calculated by giving 1 points to "yes" answers and 0 points to "no" answers.[12]

The SF-36 questionnaire was used to evaluate quality of life. Developed by the Rand Corporation, it was translated into Turkish and validity and reliability study performed.[13,14] The form is composed of 36 items measuring 8 dimensions: physical function, social function, role limitations due to physical problems, role limitations due to emotional problems, mental health, energy/vitality, general perception of pain and health. Subscales evaluate health between 0 and 100, with 0 indicating 'poor health' and 100 'good health'.

Data analysis was performed using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA). The Kolmogorov-Smirnov test was used to evaluate normality distribution, the t- and chi-square tests to analyze the superiority of descriptive data in independent groups and the t-test to determine the difference between treatment groups.[15] P values of less than 0.05 were considered significant.

Results

Descriptive data are presented in Table 1. There were no significant differences between groups ($p>0.05$).

Mean duration between surgery and injection was 27.4±15.5 (range: 12 to 60) months in the fusion group. Sacroiliac pain was caused by degenerative spinal diseases in 14 patients and L5-S1 instability in 8 (spondylolysis or spondylolisthesis). Posterior spinal instrumentation and fusion operation was performed at L5-S1 in 11 patients, L4-S1 in 8 and L3-S1 in 3 (Fig. 1). Grafting from the iliac wing was performed in two cases. Allograft was used in all patients.

Mean follow-up time was 17.66±6.43 (range: 6 to 29) months for patients in the fusion group and 17.83±6.67 (range: 6 to 30) months in the non-fusion group. Single-dose injection was performed in 51 (70.8%) patients and two doses in 21 (29.2%). Of the 21 patients who received two doses, 12 were in the fusion group and 9 in the non-fusion group. The second dose was injected at an average of 5.91±4.65 (range: 1 to 12) months and 11.16±3.60 (range: 6 to 16) months following the initial injection, in the fusion and non-fusion groups, respectively. There was a significant difference in the timing of the second dose between groups ($p=0.004$).

Statistically significant improvements were observed when pre-treatment and post-treatment assessments were compared in both groups (Tables 2 and 3).

When pre-treatment and post-treatment differences of the patients in the fusion and non-fusion groups were compared, there was a statistically significant difference in favor of the non-fusion group in pain felt during activity ($p=0.042$) and no significant difference in other parameters (Table 4).

Discussion

Although SI joint arthrosis develops as a natural process of aging, surgical transactions involving the joint environment facilitates this process. Previous studies have implicated graft harvesting in the development of SI pain following spinal fusion surgery.[16,17] However, as pain can also develop on the unoperated side, further factors have been investigated.[3] The term 'adjacent segment degeneration' aims at explaining additional problems developing below and above the fusion level, based on biomechanics. An ample amount of studies have

Table 1. Descriptive data of cases.

	Fusion cases (n=22)		Non-fusion cases (n=50)		
	Min.-Max.	**Mean±SD**	**Min.-Max.**	**Mean±SD**	**p***
Age (year)	31-76	50.3±17.3	17-58	38.6±12.3	0.119
Height (cm)	150-185	164.4±10.5	153-182	167.4±9.2	0.532
Weight (kg)	53-93	74±15.1	53-105	78.5±15.5	0.537
BMI (kg/m^2)	23.55-32.95	27.1±3.4	19.4-36.2	28.03±5.2	0.672
Educational level (yrs)	5-12	6.8±3.05	5-22	9.6±6.2	0.248
	N (72)	**%**			**p†**
Gender					
Female	54	75			0.000
Male	18	25			

*: Kolmogorov-Smirnov test. †: Chi-square test. Significant p values are written in bold. SD: Standard deviation.

Table 2. Comparison of overall quality of life, pain, mobility level and disability of non-fusion patients before and after treatment.

	Before treatment (n=50)	After treatment (n=50)	t	p*
	Mean±SD	Mean±SD		
Pain (VAS)				
Pain during sleep	7.1±2.5	2.02±2.31	8.565	0.000
Pain at rest	5.94±1.39	2.16±2.31	9.305	0.000
Activity pain	9.08±0.98	2.78±3.46	10.386	0.000
Oswestry Disability Index (ODI)	29.35±4.83	14.52±6.95	9.846	0.000
Roland-Morris Questionnaire (RMQ)	9.89±4.77	4.05±2.58	7.295	0.000
Rivermead Mobility Index (RMI)	12.16±2.31	14.35±0.88	-5.575	0.000
Overall quality of life scale (SF-36)				
General health	30.88±16.03	60.29±15.15	-15.385	0.000
Physical condition	37.05±21.43	75.88±25.07	-4.698	0.000
Emotional status	55.08±20.34	72.92±22.04	-6.040	0.000
Social status	34.35±26.80	75.58±16.79	-6.463	0.000
Physical role limitation	7.35±14.69	76.47±29.93	-8.459	0.000
Emotional role limitation	9.76±25.68	72.41±35.93	-6.627	0.000
Pain	18.35±16.35	58.41±14.24	-7.504	0.000
Energy level	35.58±17.48	54.70±16.81	-5.563	0.000

*Paired samples t-test. Significant p values are written in bold. SD: Standard deviation.

Table 3. Comparison of overall quality of life, pain, mobility level and disability of fusion patients before and after treatment.

	Before treatment (n=22)	After treatment (n=22)	t	p*
	Mean±SD	Mean±SD		
Pain (VAS)				
Pain during sleep	7.03±2.58	1.61±1.55	9.266	0.000
Pain at rest	4.92±2.09	0.26±0.66	11.423	0.000
Activity pain	8.30±1.59	3.11±1.77	11.036	0.000
Oswestry Disability Index (ODI)	28.36±4.85	14.50±6.05	9.647	0.000
Roland-Morris Questionnaire (RMQ)	10.55±6.15	3.33±3.09	8.654	0.000
Rivermead Mobility Index (RMI)	12.11±1.77	14.66±0.48	-6.706	0.000
Overall quality of life scale (SF-36)				
General health	47.33±17.81	71.67±17.08	-6.720	0.000
Physical condition	48.85±19.91	74.61±19.63	-6.980	0.000
Emotional status	50.13±17.75	68.53±21.43	9.870	0.004
Social status	34.35±26.80	75.58±16.79	-6.463	0.000
Physical role limitation	9.61±19.20	79.61±33.01	-9.592	0.000
Emotional role limitation	4.44±17.21	55.11±42.94	-10.271	0.000
Pain	17.67±12.26	60.00±19.36	-8.554	0.000
Energy level	43.00±13.99	63.33±16.22	-6.625	0.000

*Paired samples t-test. Significant p values are written in bold. SD: Standard deviation.

shown that fusion operations, terminated at the sacrum in particular, facilitate SI joint degeneration whether radiologically marked or not and leads to postoperative pain.[1-3,7,18] Therefore, in fusion operations terminated at the L5 vertebra or sacrum, the SI joint is accepted as the distal adjacent segment in which load transmission increases.[1,19]

Adjacent segment degeneration should be considered a different disease from its cause as this clinical condition leads to a new diagnosis and treatment process.

Table 4. Comparison of overall quality of life, pain, mobility level and disability of fusion and non-fusion patients after treatment.

	Fusion cases (n=22)	**Non-fusion cases (n=50)**	**t**	**p***
	Δ±SD	**Δ±SD**		
Pain (VAS)				
Pain during sleep	5.94±2.48	7.06±2.15	-1.359	0.184
Pain at rest	5.41±3.16	5.33±2.55	0.076	0.940
Activity pain	5.11±2.28	6.66±1.83	-2.092	0.042
Oswestry Disability Index (ODI)	4.72±3.24	5.22±3.97	-0.295	0.774
Roland-Morris Questionnaire (RMQ)	7.00±4.00	8.00±3.93	-0.535	0.600
Rivermead Mobility Index (RMI)	2.66±.86	2.55±.72	0.292	0.772
Overall quality of life scale (SF-36)				
General health	19.93±18.67	24.70±20.65	0.682	0.500
Physical condition	23.12±13.07	28.52±13.08	0.964	0.345
Emotional status	13.33±17.05	19.88±20.15	0.985	0.333
Social status	24.16±24.30	29.411±29.29	0.547	0.589
Physical role limitation	63.00±38.53	51.32±39.70	-0.842	0.407
Emotional role limitation	68.88±42.66	56.47±42.03	-0.828	0.414
Pain	39.37±23.55	41.17±31.69	0.143	0.888
Energy level	24.00±13.65	22.35±18.96	-0.278	0.783
	Mean±SD	**Mean±SD**	**t**	**p***
Patient satisfaction level (VAS)	8.07±1.49	8.04±1.67	-0.111	0.913

*Independent samples t-test. Significant p values are written in bold. SD: Standard deviation.

The origin of pain in the SI joint following lumbosacral fusion may be difficult to define. Adjacent segment degeneration is always a risk for revision operation.[20]

The role of SI joint blockade has been discussed in the treatment of sacroiliitis and positive effects have been reported.[7,21] However, it is not yet a proven treatment method and is frequently applied under every condition due to the lack of a consensus about SI joint pain.[5,6] As instrumented fusion is the only surgical option for SI-related problems, SI blockade can be considered a non-invasive and effective treatment alternative.

In the present study, the effectiveness of SI blockade in the treatment of SI pain following fusion operation involving the sacrum was indirectly investigated through comparison with non-operated patients. We hypothesized that the effect of SI blockade is lower in patients who had undergone fusion and rigid instrumentation as the etiology of pain is more complex and multifactorial in these patients. Therefore, SI injection does not appear to be as effective.

No significant difference was determined between two groups and similar improvements in pain and daily activities were obtained in fusion and non-fusion patients. There are few studies that have investigated the results of treatment, with the exception of diagnostic injections.[3,4,18] In their study analyzing the effectiveness of SI blockade in 39 patients without spondyloarthropathy, 12 of which had lumbar fusion (4 involving the sacrum), Liliang et al. reported a poorer success rate in the fusion group.[7] In another study conducted with 14 patients (10 involving the sacrum), results of patients with fusion were analyzed and short-term outcomes were reported to be good.[22]

In our study, the spinal fusion group was composed of patients whose fusion involved the sacrum. Although pain is more prominent in patients with fusions terminated at S1, SI joint degeneration also develops in patients with fusion terminated at L5.[1] Therefore, the study group's being composed solely of fusions terminated at S1 can be considered an advantage of the study. While the response of the two cases in which iliac wing graft was used was similar to other patients, a statistical assessment could not be performed due to the small number of patients.

A second injection was required in a shorter time in the fusion group. Significant differences between groups were not observed in parameters, with the exception of activity pain (Table 4). Activity pain, a component of the pain scale, was greater in the fusion group than the non-fusion group. However, this pain did not significantly af-

fect functional status and quality of life.

In conclusion, SI blockade has a similar therapeutic effect on patients who underwent lumbosacral fusion surgery as on non-operated patients. A different treatment method is not necessary for the treatment of SI pain in fusion patients with S1 involvement.

Conflicts of Interest: No conflicts declared.

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