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ORIGINAL ARTICLE

Retrospective evaluation of quality of life in patients undergoing sacroiliac joint denervation with simplicity

Simplicity ile sakroiliak eklem denervasyonu uygulanan olgularda yaşam kalitesinin retrospektif olarak değerlendirilmesi

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Summary

Objectives: The sacroiliac joint (SIJ) is the third most common cause of low back pain. The treatment of SIJ-induced pain is often conservative. When conservative treatments fail, interventional treatment methods, such as intra-articular injection or radiofrequency (RF) denervation are applied. Recently, in addition to the success of this interventional treatment applied, increased patient satisfaction and quality of life after treatment have also gained importance. The aim of this retrospective study was to evaluate pain management and improvement in the quality of life in patients with SIJ pain who underwent RF denervation with the simplicity probe.

Methods: The files of patients with SIJ degeneration on Ferguson X-ray, who underwent diagnostic intra-articular block for SIJ and had more than 50% reduction in pain were screened, and 38 cases in which simplicity RF neurotomy was applied were identified. The age, sex, and numerical rating scale (NRS) and short form (SF)-36 scores of the remaining 30 patients were recorded before and at 6 months after the procedure.

Results: There was a statistically significant decrease in NRS between the pre-procedure and post-procedure (6-month) values. The decrease in NRS did not significantly differ according to sex. A statistically significant improvement in all the domains of SF-36 in the post-procedure period compared to the pre-procedure period. There was no significant sex-related difference in the improvement of the SF-36 domains, except for the emotional role functioning domain, for which the scores were significantly higher in women than in men.

Conclusion: In patients with SIJ pain who positively respond to steroid injection, the application of Simplicity III achieves long-term pain management and increases patient comfort and satisfaction pain without any complications.

Keywords: Back pain; chronic pain; radiofrequency; sacroiliac joint.

Özet

Amaç: Sakroiliak eklem ağrıları üçüncü en sık bel ağrısı sebebidir. Sakroiliak eklem kaynaklı ağrıların tedavisi sıklıkla konservatiftir. Konservatif tedaviler başarısız olduğunda eklem içi enjeksiyon veya radyofrekans denervasyon gibi girişimsel tedavi yöntemleri uygulanır. Ancak son zamanlarda yapılan girişimsel tedavinin başarısı kadar, tedavi sonrası hasta memnuniyeti ve yaşam kalitesinin artması da oldukça önem kazanmıştır. Bu retrospektif çalışmanın amacı, sakroiliak eklem ağrısı olan ve simplicity radyofrekans denervasyon uygulanan hastalarda ağrı sağaltımını ve yaşam kalitelerindeki iyileşmeyi değerlendirmektir.

Gereç ve Yöntem: Ferguson grafide sakroiliak eklem dejenerasyonu bulunan, sakroiliak eklem için tanısal intraartiküler blok uygulanan ve ağrısında %50'den fazla azalma olan hastalardan simplicity radyofrekans nörotomi uygulanmış 38 hasta dosyası incelendi. Hastaların yaş, cinsiyet, işlem öncesi ve işlemden altı ay sonraki kontrollerindeki NRS ve SF-36 skorları kaydedildi.

Bulgular: İşlem öncesi ve işlemden altı ay sonra bakılan NRS değerlerinde, işlem öncesine göre işlem sonrası dönemde istatistiksel olarak anlamlı azalma vardı ve NRS değerlerindeki azalmada cinsiyetler arası fark yoktu. İşlem öncesi ve işlemden altı ay sonra bakılan SF-36 değerleri incelendi. Tüm alt ölçeklerde işlem öncesine göre, işlem sonrası dönemde istatistiksel olarak anlamlı düzelme vardı. Bu düzelmede cinsiyetler arasında fark var mı diye bakıldığında ise emosyonel rol güçlüğündeki düzelme hariç, diğer alt ölçeklerde cinsiyetler arasında fark yoktu, hepsinde benzer oranda iyileşme mevcuttu. Sadece emosyonel rol güçlüğündeki düzelme kadınlarda erkeklere göre daha fazlaydı ve bu fark istatistiksel olarak anlamlıydı.

Sonuç: Steroid enjeksiyonuna olumlu yanıt veren sakroiliak eklem ağrısı olan hastalarda, simplicity III uygulaması uzun süreli ağrı yönetimi sağlar ve herhangi bir komplikasyon olmaksızın hasta konforunu ve ağrı memnuniyetini artırır.

Anahtar sözcükler: Bel ağrısı; kronik ağrı; sakroiliak eklem; radyofrekans.

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Introduction

It has been reported that approximately 16–30% of low back pain is caused by the sacroiliac joint (SIJ).[1] SIJ is the third most common cause of low back pain after facet joint and discogenic pain. SIJ pain may originate from the joint itself or from surrounding structures, such as the joint capsule and ligament.[2] The treatment of SIJ-induced pain is often conservative and includes physiotherapy and medical therapy, such as non-steroidal anti-inflammatory drugs. When conservative treatments fail, interventional treatment methods, for example, intra-articular injection and radiofrequency (RF) denervation are applied.[3] The RF ablation of the lateral sacral plexus is an interventional treatment option for SIJ pain. In humans, the primary innervation of the posterior SIJ is formed by the lateral branches of the S1-3 dorsal rami and the contribution of the L5 dorsal ramus in most individuals.[4] In addition, in a cadaver study, McGrath and Zhang[5] reported that more than 50% of SIJs presented with the afferent innervation of S4 to the long posterior sacroiliac ligament.

The Simplicity III RF probe provides percutaneous access to the lateral branches of the S1-4 dorsal rami from a single entry point. When the formed lesion is coupled with the RF ablation of the L5 dorsal ramus, the sensory nerve fibers feeding SIJ are blocked. RF ablation with the simplicity probe is a very effective technique in the treatment of pain originating from SIJ.[6] Recently, in addition to the success of this interventional treatment, increased patient satisfaction and quality of life after treatment have also gained importance. SF-36 is one of the questionnaires used to evaluate the quality of life.[7] The validity and reliability of the Turkish version of SF-36 was demonstrated in 1999.[8] This questionnaire consists of a total of 36 items to measure the quality of life based on the respondent's experience over the last 4 weeks. SF-36 comprises eight domains: physical functioning, physical role limitations, emotional role limitations, energy/vitality, mental health, social functioning, bodily pain, and general health perceptions.[9]

The aim of this retrospective study was to evaluate pain management and improvement in the quality of life of patients with SIJ pain who underwent RF denervation with the simplicity probe.

Material and Methods

This is a retrospective observational study, in which the files of patients that underwent RF denervation with the simplicity probe between December 1, 2014 and February 1, 2015 were reviewed. The files of patients with SIJ degeneration on Ferguson X-ray, who underwent diagnostic intra-articular block for SIJ and had more than 50% reduction in pain were screened, and 38 cases in which simplicity RF neurotomy was applied were identified. Eight patients who simultaneously underwent additional interventional procedures were excluded from the study. The age, sex, and NRS and SF-36 scores of the remaining 30 patients were recorded before and at 6 months after the procedure.

Treatment Algorithm

Intra-articular injection is applied to patients who present to our clinic due to SIJ pain and do not respond to conservative treatments, unless there are contraindications. In this procedure, 4 mg dexamethasone + 2 mL 0.05% bupivacaine injection is made by entering with a 90 mm 22-G spinal needle from the lower 1/3 of the joint. If there is a 50% or more reduction in pain at the control evaluation at 30 min after the procedure, the response is considered positive and RF ablation is routinely applied with the simplicity III probe.

Technique

The simplicity III probe is entered approximately 1 cm lateral and 1 cm below the S4 vertebra. After contacting the sacrum, the probe is placed lateral to the sacral foramen and medial to the articular line. The tip of the probe is advanced to the sacral ala. After confirming its location on the lateral fluoroscopy image, 50 hertz 0.5 volt sensory stimulation is applied to obtain paresthesia. The motor response is checked at 1.5 volts and 2 hertz. If there is no motor response in the ipsilateral lower extremity, RF ablation is performed. The S1-4 nerves are ablated by forming three monopolar and two bipolar lesions at 80 °C for 90 s (Fig. 1). Then, RF ablation is applied to the L5 dorsal ramus at 80 °C for 90 s using a 90-mm RF needle with a 10-mm active tip. If pain is bilateral, the same procedure is performed bilaterally (Fig. 2).

Patients are routinely called for a follow-up after 2 weeks, 1 month, 3 months, and 6 months following the procedure. Pain severity is questioned

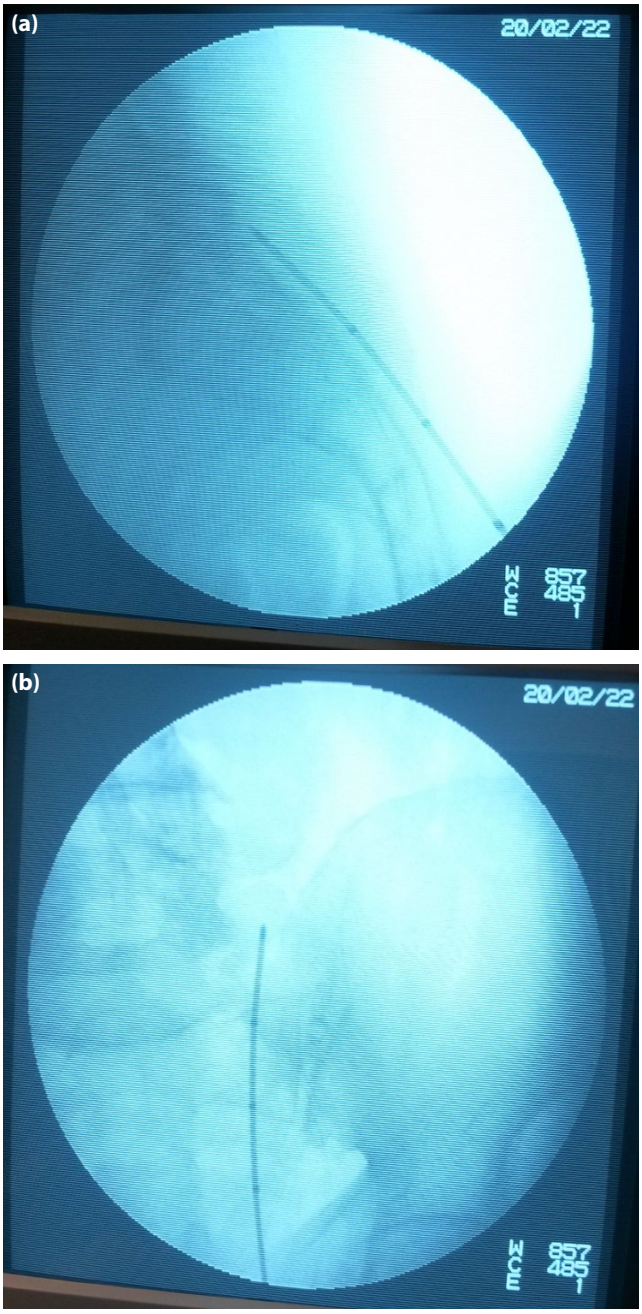

Figure 1. (a) Unilateral lateral view. **(b)** Unilateral Anteroposterior view.

with the NRS. The quality of life is measured before the procedure and at 6 months after the procedure using SF-36. Each item of SF-36 is scored between 0 and 5, and the score is then converted to a scale of 0–100.[9]

Statistical Analysis

Statistical analysis was performed using IBM SPSS version 21. The frequency calculations of categorical variables were expressed as percentages and analyzed with the Chi-square test. Since the number of subjects was more than 30, parametric methods were preferred according to the central limit theorem. The dependent-samples t-test was used to compare the mean values before and after treatment. The repeated measures analysis of variance (time x sex interaction) was used to determine whether the differences between the pre-procedure and post-procedure values differed according to sex.

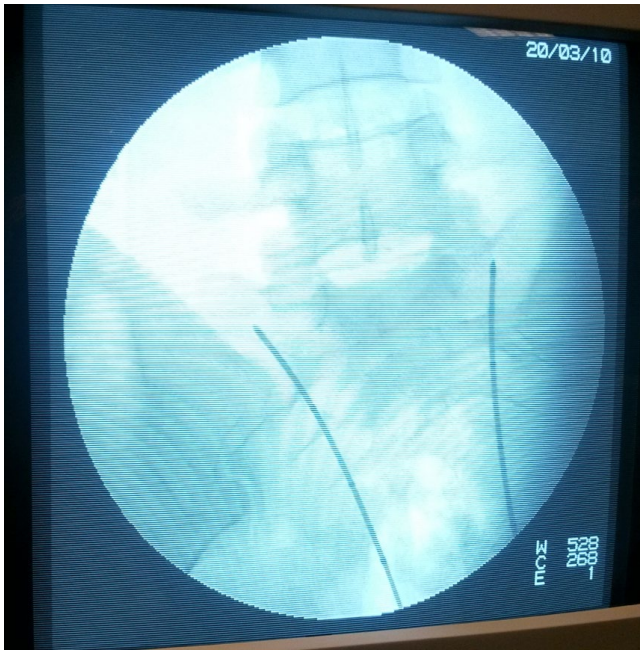

Figure 2. Bilateral prodecure.

Table 1. Sex analysis

Valid	Frequency	Percent	VP	CP
Male	11	36.7	36.7	36.7
Female	19	63.3	63.3	100.0
Total	30	100.0	100.0	

VP: Valid percent; CP: Cumulative percent.

Results

The age of the 30 patients ranged from 37 to 92 years, with a mean value of 69.03±13.3 years. Eleven patients were male and 19 were female (63.6%) (Table 1).

Unilateral procedures were performed in 22 patients and bilateral procedures in eight. No complication was observed in any of the patients during the procedure or follow-up. There was a statistically significant decrease in the NRS scores of the patients after the procedure compared to the pre-procedure values ($p<0.05$) (Table 2), but no significant difference was observed in relation to sex.

Table 2. NRS analysis

	Test value=0				
	t	df	Sig. (2-tailed)	Mean difference	95% CI of the difference
					Lower / Upper
NRS first	45.775	29	0.00	8.133	7.77 / 8.5
NRS last	11.534	29	0.00	3.333	2.74 / 3.92

NRS: Numerical Rating Scale; CI: Confidence interval.

Table 3. Short form-36 analysis

	Before treatment Mean±SD	After treatment Mean±SD	p
Physical functioning	16±17.04	53.8±28.90	<0.001
Physical role limitations	0±0	39.2±42.39	<0.001
Emotional role limitations	45.6±49.90	58.6±32.38	<0.001
Energy/vitality	23±16.48	64.2±22.40	<0.001
Mental health	41.3±16.52	73.9±15.03	<0.001
Social functioning	16.7±15.51	63.6±23.75	<0.001
Bodily pain	14.3±14.06	65.6±23.86	<0.001
General health perceptions	30.2±20.70	50±24.60	<0.001
Health chance	25.8±16.71	80.8±19.35	<0.001

SD: Standard deviation.

A statistically significant improvement in all the domains of SF-36 in the post-procedure period compared to the pre-procedure period (Table 3). There was no significant sex-related difference in the improvement of the SF-36 domains, except for the emotional role functioning domain, for which the scores were significantly higher in women than in men (Fig. 3).

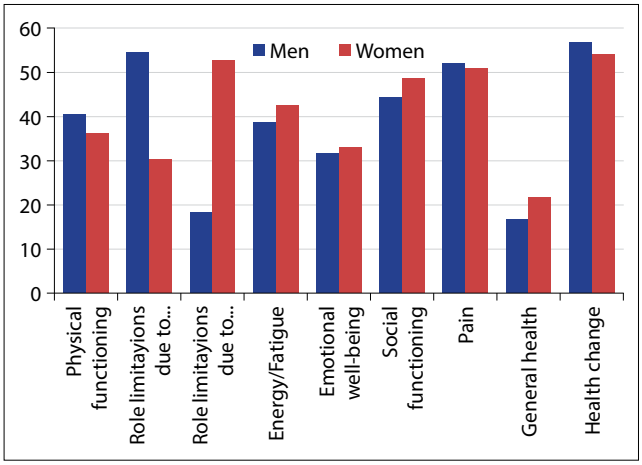

Figure 3. Short form-36 quality of life analysis by sex.

Discussion

According to the definition made by the World Health Organization in 1948, "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."[10] Therefore, when interpreting treatment results, in addition to objective results, the results of well-being perceived by the patient should also be evaluated. Sacroiliac ablation therapy with the simplicity probe is frequently applied, but no study has undertaken a detailed evaluation of the SF-36 questionnaire when evaluating the results of this method. Therefore, our study is the first to assess the results of sacroiliac ablation therapy with the simplicity probe in detail using the SF-36 questionnaire.

The Rolland-Morris disability questionnaire (RMDQ) measures functionality in patients, whereas the Oswestry disability index (ODI) is used to measure physical function and pain. ODI and RMDQ are commonly used to measure the spine-specific health status of patients with low back pain. SF-36, on the other hand, is a highly valid measurement method used to assess the general health status of patients. Ko and Chae conducted

a study on how the spine-specific health status of patients reflected their general health status. The authors found a low-level significant correlation between the physical components of SF-36 and ODI and RMDQ, and a moderately significant correlation between the mental components of SF-36 and the other two scales.[11] Copay and Cher[12] used ODI in the treatment of the SIJ and demonstrated the validity of this questionnaire in patients with low back pain. Although ODI is a widely used and gold standard questionnaire for low back pain, ODI is specific to low back pain and does not evaluate general health.[12] In addition, ODI does not allow for the comparison of the previous (e.g., 1 year earlier) and current pain status of patients. From this perspective, SF-36 is a better option in evaluating the general well-being of patients.

Hegarty[13] evaluated 11 female patients who underwent RF denervation with the simplicity III probe using SF-12. They evaluated the pain scores of the patients with the visual analog scale and reported a significant improvement, similar to our study. The authors also obtained the overall health score using SF-12, but this assessment was not as detailed as SF-36. In addition, that study did not contain any male patients. Therefore, the authors were not able to determine whether there was a difference between the sexes in terms of quality of life. In contrast, in the current study, we detected a significant difference between the male and female patients in terms of their scores in the emotional role limitations domain.

In a meta-analysis[14] of studies examining patients with low back pain and SIJ pain treated with conventional RF and cooled RF, the mean age of the patients was found to be similar in all studies. The mean age ranged from 41 to 65 years in the RF neurotomy groups and 41–64 years in the control groups. In our study, the mean age was 69 years, and the oldest patient was 92 years old. Although the mean age of our patients was high, their quality of life increased. Similarly, in the studies included in the meta-analysis, the rate of male patients varied between 12 and 72% in the RF groups and between 13 and 74% in the control groups. In our study, we found this rate to be similar (36.4%). However, none of the studies covered by the meta-analysis evaluated SF-36. Our study is the first in this respect.

Interventional procedures, including conventional RF denervation, bipolar RF denervation, and cooled RF denervation play an important role in the management of patients with SIJ pain. RF ablation is technically challenging due to the extensive innervation network of SIJ. Similar to our study, Reddy et al.[15] used the simplicity method and listed its advantages as the probe being easy to insert and the technique providing a single point of entry, increasing the possibility of accurate probe placement due to the presence of a single probe, being more reliable, and having a shorter RF time. The authors reported a significant decrease in the NRS scores in 16 of the patients examined. The general health evaluation of the patients was performed with the SF-12 questionnaire, and a significant improvement was detected.

In a study by Bayerl et al.,[6] the classical monopolar denervation technique was applied to 57 patients and the simplicity III probe technique to 64. In the results evaluated 1 year later, simplicity III was found to be more successful in pain relief. In addition, the authors found a significant difference between the groups in terms of exposure to X-ray radiation and the duration of the procedure, which is very important for patient safety and comfort.

Limitations

Our study has certain limitations, including its retrospective nature, absence of a control group, and the SF-36 evaluation not being performed over a long-term follow-up. There is a need for randomized, prospective studies on this subject. General health assessment in pain of SIJ origin should also be undertaken with other techniques, such as cooled RF over longer follow-ups.

Conclusion

Although steroid injection is an effective treatment method in the treatment of SIJ pain, it is generally short-acting. In patients with SIJ pain who positively respond to steroid injection, the application of simplicity III achieves long-term pain management and increases patient comfort and satisfaction pain without any complications.

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Ethics Committee Approval: The Hacettepe University Clinical Research Ethics Committee granted approval for this study (date: 05.11.2014, number: 14/558-07).

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