

# Assessment of the Efficiency of Intra-Articular Corticosteroid and Local Anesthetic Injection in Patients with Sacroiliac Joint Dysfunction: 3-Year Treatment Outcomes: A Retrospective Study

## Sakroiliyak Eklem Disfonksiyonu Olan Hastalarda Eklem İçi Kortikosteroid ve Lokal Anestezik Enjeksiyon Etkinliğinin Değerlendirilmesi: 3 Yıllık Deneyimimiz: Retrospektif Çalışma

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**ABSTRACT Objective:** The aim of the study is to evaluate the therapeutic efficiency of fluoroscopy-guided intra-articular corticosteroid and local anesthetic injections into the sacroiliac joint (SIJ) in patients with SIJ dysfunction. **Material and Methods:** Two hundred patients, who applied to Ankara University Faculty of Medicine, Pain Medicine outpatient clinic and diagnosed with SIJ dysfunction between January 2017 and January 2020, and were performed fluoroscopy-guided intra-articular corticosteroid and local anesthetic injection in the operating room, were included in the study. We evaluated the visual analog scale (VAS) and Oswestry Disability Index (ODI) scores of the patients before and after SIJ injection at (at 1<sup>st</sup> hour only for VAS) 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> month. **Results:** The current study with 200 patients, retrospectively found a significant decrease in VAS and ODI scores after local anesthetic and corticosteroid injection into the SIJ. VAS and ODI scores at 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> month after injection were significantly lower than before injection. Patients' VAS scores also showed a significant decrease one hour after the injection. Gluteal region was the most described localization of pain by patients. **Conclusion:** Fluoroscopy-guided intra-articular corticosteroid and local anesthetic injection appears to be an effective method on sacroiliac joint pain and disability at least six-month follow-up.

**Keywords:** Fluoroscopy; sacroiliac joint; injection; intra-articular; steroids

**ÖZET Amaç:** Bu çalışmanın amacı, sakroiliyak eklem (SİE) disfonksiyonu olan hastalarda SİE içine floroskopi eşliğinde intraartiküler kortikosteroid ve lokal anestezik enjeksiyonlarının terapötik etkinliğini değerlendirmektir. **Gereç ve Yöntemler:** Ocak 2017-Ocak 2020 tarihleri arasında Ankara Üniversitesi Tıp Fakültesi Algoloji polikliniğine başvuran ve SİE disfonksiyon tanısı ile ameliyathanede floroskopi eşliğinde eklem içi kortikosteroid ve lokal anestezik enjeksiyonu yapılan 200 hasta çalışmaya dâhil edildi. Hastaların SİE enjeksiyon öncesi ve sonrası [sadece vizüel analog skala (VAS) için 1. saatte] 1, 3 ve 6. aydaki VAS ve Oswestry Dizabilite İndeksi (ODİ) skorlarını değerlendirdik. **Bulgular:** İki yüz hasta ile yapılan mevcut çalışma, retrospektif olarak, SİE'ye lokal anestezik ve kortikosteroid enjeksiyonundan sonra VAS ve ODİ skorlarında anlamlı bir düşüş buldu. Enjeksiyondan sonraki 1, 3 ve 6. aydaki VAS ve ODI skorları, enjeksiyon öncesine göre önemli ölçüde düştü. Hastaların işlemden 1 saat sonraki VAS skorları da anlamlı düşüş gösterdi. Hastalar tarafından ağrının en çok tarif edilen lokalizasyonu gluteal bölge idi. **Sonuç:** En az 6 aylık izlemde floroskopi eşliğinde intraartiküler kortikosteroid ve lokal anestezik enjeksiyonu, SİE ağrısı ve dizabilite üzerine etkili bir yöntem olarak görülmektedir.

**Anahtar Kelimeler:** Floroskopi; sakroiliyak eklem; enjeksiyon; intraartiküler; steroidler

Chronic low back pain is extremely common in patients. The prevalence of sacroiliac joint (SIJ) pain was reported between 10% and 25% in chronic low back pain.<sup>1</sup> SIJ pain impairs quality of life similarly

to other spine pathology. The SIJ takes part in the equal distribution of the load on the lower extremity. The anterior part of SIJ is a true synovial joint and the posterior part is a syndesmosis consisting of lig-

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aments and the muscles affect the stability of the SIJ.<sup>2</sup> The joint has less than 4 physiological motion.<sup>3</sup> The nerve supply to the SIJ varies between individuals, ventral rami of L4-L5 and dorsal rami of S1-S3 playing an important role in the innervation of the sacroiliac joint.<sup>4</sup>

SIJ pain can originate from intra-articular causes such as infection, spondyloarthropathies, malignancies, or extra-articular causes such as enthesopathy, fractures, ligament injuries, myofascia. A specific cause often cannot be identified. Certain factors such as trauma, scoliosis, leg length discrepancy, lumbar fusion surgery, abnormal gait pattern and pregnancy increase the risk of developing SIJ pain. Pain is generally described in the gluteal/hip region by patients and may spread to the lower and upper lumbar region, groin, and lower extremities.

Treatment of SIJ pain should consist of a multidisciplinary approach according to the severity of the disease. Patients resistant to conservative therapy are suitable for interventional pain management techniques which are intra-or peri-articular injection of corticosteroid and local anesthetic, radiofrequency neurotomy, and finally surgical stabilization.<sup>5</sup> Studies have shown that steroid injection into the SIJ results in long-term pain relief.<sup>6</sup>

The aim of the study is to observe the efficiency of fluoroscopy guided SIJ corticosteroid and local anesthetic intra-articular injection in pain management of patients with SIJ dysfunction.

## MATERIAL AND METHODS

This was a retrospective study of 200 patients treated between January 2017 and January 2020. Patients who applied to the Ankara University Faculty of Medicine, Pain Medicine outpatient clinic for lower back, gluteal region and thigh pain were analysed. The diagnosis of SIJ dysfunction was made with anamnesis, physical examination and imaging guidance. Patients were evaluated with sciatica and femoral nerve stretching tests, lumbar-hip and SIJ movements' examination, motor deficit, deep tendon reflexes. Patients with pain caused by pressure on the SIJ and with at least three positive tests of the 5 (distraction, compression, sacral thrust, Gaenslen, thigh

thrust) were included in the study.<sup>7,8</sup> FABER (flexion-abduction-external rotation) and Gaenslen's tests were especially important. Inflammatory, tumoral, infectious disease of the SIJ, history of lumbosacral fusion surgery or hip arthroplasty, neuromuscular diseases, spondyloarthropathy, coagulopathy, psychiatric impairment, allergy to medications and pregnancy were exclusion criteria. Magnetic resonance imaging (MRI) and radiography of SIJ were used to evaluate changes in the joint. It was confirmed by lumbar MRI to exclude organic pathology in lumbar region. Patients were applied intra-articular local anesthetic and corticosteroid injections under fluoroscopic guidance in the operating room environment. The injections were performed with the single needle technique with inferior approach. After 1-2 mL contrast material to confirm the needle placement, all patients were injected with a combination of 40 mg triamcinoloneacetone (1 mL), 50 mg prilocaine hydrochloride (2.5 mL, 20 mg/mL), 12.5 mg (2.5 mL, 5 mg/mL) bupivacaine hydrochloride into the SIJ (Figure 1). If the patients did not describe more than 70% reduction in pain, a second intra-articular injection was performed two weeks later.

Visual analog scale (VAS) for pain and the Oswestry Disability Index (ODI) for the disability due to pain were evaluated before the injection and at (one hour after injection only for VAS), 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> months after the injection.<sup>9,10</sup> Patients were informed about the use of the VAS (0=no pain, 5=moderate pain, 10=extremely severe pain). Severity of pain, walking, standing, sitting, self-care, lifting-carrying, sleep, sexual life, travelling and social life were evaluated with ODI. Total scores vary between 0 and 50 and the level of disability increases as the score in-

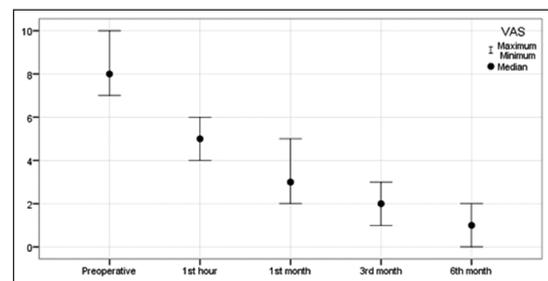


FIGURE 1: Patients' mean VAS scores according to months. VAS: Visual analog scale.

creases. Change in the VAS and ODI scores between pre- and post-injection periods were assessed.

The study was conducted in accordance with the principles of the Declaration of Helsinki. Protocol number of this retrospective study (İ4-263-21) was obtained from the ethics committee of Ankara University Faculty of Medicine Human Research Ethics Committee for approval (date: 22.04.2021).

## STATISTICAL ANALYSIS

Recorded data were analysed using the SPSS version 11.5 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean±standard deviation (SD), median and minimum-maximum values. Qualitative data were expressed as frequency and percentage. The Friedman test (Friedman's two-way of analysis of variance by ranks) was used to test quantitative data changes. *p* value <0.05 was considered significant.

## RESULTS

Files of two hundred twenty-five patients who applied to the outpatient clinic with lower back, gluteal region, groin and thigh pain between 2017 and 2020 were analyzed retrospectively. Twenty-five patients were excluded from the study due to lumbosacral fusion surgery, pregnancy, malignancy and rheumatologic diseases such as ankylosing spondylitis (AS). Of the 200 patients, 143 (71.5%) were female and 57 (28.5%) were male, and the demographic data are shown in Table 1. While 40 (20.0%) patients had a history of trauma, the etiologic cause was unknown in 160 (80%) patients. The patients described pain mostly in the gluteal region, then in the lower and upper lumbar, lower extremities and inguinal regions, respectively. The first injection was not effective in 45 patients and a second intraarticular injection was performed. After the second injection, all patients reached 70% decreases in pain level.

The mean VAS scores before the injection, at 1 hour, 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> month after injection were recorded as 8.5±1.1, 4.7±0.6, 3.4±0.9, 2.1±0.8 and 1.2±0.4 respectively as shown in Table 1.

The mean ODI score of the patients before the injection was recorded as 46.3±7.5%. The mean ODI

**TABLE 1:** Demographic and clinical features of the patients with sacroiliac dysfunction.

|  | Mean±SD (minimum-maximum values) |
|--|----------------------------------|
| Age (years)                                | 54.6±2.5 (36-75)                 |
| Height (cm)                                | 160.7±7.3 (150-182)              |
| Weight (kg)                                | 66.5±12.0 (51-100)               |
| Body mass index                            | 25.9±4.4 (19.0-38.7)             |
| Localization of pain                       |                                  |
| Gluteal                                    | 95 (47.5%)                       |
| Lower and upper lumbar                     | 55 (27.5%)                       |
| Groin                                      | 20 (10%)                         |
| Lower extremities                          | 30 (15%)                         |
| Effective first sacroiliac joint injection | 155 (77.5%)                      |
| Second injection needed                    | 45 (22.5%)                       |

SD: Standard deviation.

**TABLE 2:** Patients pre-and post-injection VAS and ODI scores.

| n=30                  | Mean±SD  | <i>p</i> value |
|-----------------------|----------|----------------|
| Pre-injection VAS     | 8.5±1.1  |                |
| Post- injection VAS   |          |                |
| 1 <sup>st</sup> hour  | 4.7±0.6  | <0.001         |
| 1 <sup>st</sup> month | 3.4±0.9  | <0.001         |
| 3 <sup>rd</sup> month | 2.1±0.8  | <0.001         |
| 6 <sup>th</sup> month | 1.2±0.4  | <0.001         |
| Pre-injection ODI     | 46.3±7.5 |                |
| Post-injection ODI    |          |                |
| 1 <sup>st</sup> month | 22.2±4.0 | <0.001         |
| 3 <sup>rd</sup> month | 15.4±3.5 | <0.001         |
| 6 <sup>th</sup> month | 9.7±2.9  | <0.001         |

\**p*<0.05 (Friedman's Two-Way of Analysis of Variance by Ranks was used to test whether VAS and ODI values differ over time); SD: Standard deviation; VAS: Visual analog scale; ODI: Oswestry Disability Index.

score was 22.2±4% at the 1<sup>st</sup> month, 15.4±3.5% at 3<sup>rd</sup> month, and 9.7±2.9% at 6<sup>th</sup> month. Changes in VAS and ODI scores at follow-up were statistically significant (*p*<0.05) as shown in Table 2. The mean values of VAS and ODI scores varying by months are shown in Figure 2 and Figure 3.

## DISCUSSION

The current study with 200 patients retrospectively observed a significant decrease in VAS and ODI scores after intraarticular local anesthetic and corticosteroid injection to the SIJ. VAS and ODI scores at

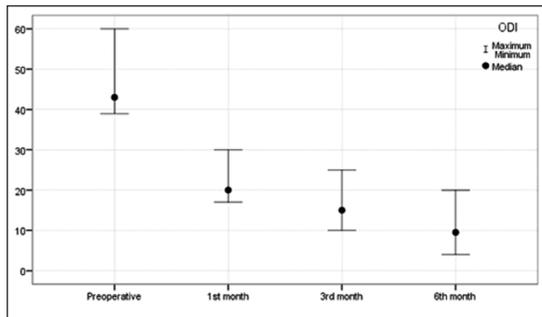


FIGURE 2: Patients' mean ODI scores according to months.  
ODI: Oswestry Disability Index.

1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> month after injection were significantly lower than just before SIJ injection. Patients' VAS scores also showed a significant decrease one hour after the sacroiliac injection. Forty-five patients required a second injection because of insufficient pain relief. Gluteal region was the most described localization of pain by patients.

SIJ contributes to chronic low back pain and often neglected by patients. When the joint is biomechanically insufficient to distribute the load to the lower extremity, SIJ dysfunction is presented.<sup>11</sup> Innervation is variable, therefore symptoms differ in patients. In the study of Slipman et al., localization of pain in patients with SIJ dysfunction were hip, lumbar, leg (descending below the knee) and foot as lower extremity, respectively.<sup>12</sup> In our study, patients described the localization of pain mostly as the gluteal region and the other pain distributions of the patients were in accordance with the literature.

Patients with SIJ pain have either no radiologic abnormalities or only mild osteoarthritis.<sup>13,14</sup>

In asymptomatic patients, degenerative SIJ changes on direct graphy are common, therefore, imaging techniques are not fully diagnostic. Although physical examination is essential in evaluation of the sacroiliac joint, no noninvasive pathognomonic test exists to reliably differentiate it from other potential pain generators.<sup>15</sup> Therefore, the diagnosis should be confirmed with combination of physical examination, imaging technique and response to sacroiliac local anesthetic injection.<sup>16</sup>

Intraarticular injections are primary and effective treatment method in patients with SIJ dysfunction, who do not benefit from conservative treatment. Systematic reviews showed limited evidence for therapeutic intraarticular SIJ injections.<sup>1,17</sup> Injections continue to be used due to their less invasive nature even though the evidence is not strong. In our study, the decrease in the pain levels of the patients was satisfactory for the 6 months. Forty-five of 200 patients needed a second injection to reach more than 70% pain relief. We found a significant decrease in VAS and ODI scores after local anesthetic and corticosteroid injection into the SI joint. VAS and ODI scores at 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> month after injection were significantly lower than VAS and ODI scores just before injection. Patients' VAS scores also showed a significant decrease in 1<sup>st</sup> hour ( $p < 0.05$ ).

SIJ involvement can be seen in diseases such as AS, osteoarthritis and rheumatoid arthritis. AS usually affects the spine and sacroiliac joints. Patients with rheumatologic diseases were excluded from the study due to the nature of our study. The pain occurring especially at rest or midnight distinguishes AS

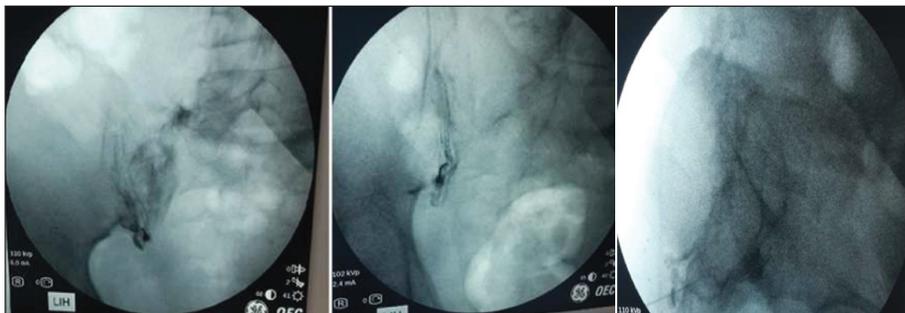


FIGURE 3: Fluoroscopy images example of our patients during contrast dye into the sacroiliac joint.

pain from lumbar hernia. Maugers et al. reported their experience of SIJ block in patients with seronegative spondyloarthropathy with >70% pain relief in a retrospective study.<sup>18</sup>

In SIJ pain, not only intraarticular but also periarticular and combined injections have been tried. Corticosteroid injections to posterior interosseous ligament and S1-3 lateral branches also play a role in pain relief. On the other hand, Borowsky and Fagen reported that the combined sacroiliac and S1-3 injection technique is not a superior treatment technique to sacroiliac injection alone.<sup>19</sup> There are studies showing injection around the posterior interosseous ligament provides comparable improvement with intraarticular injection.<sup>20,21</sup> In addition, Nacey et al. reported no significant difference in the degree of pain relief achieved with intraarticular and periarticular injections.<sup>13</sup> In this retrospective study, we evaluated only intraarticular corticosteroid and local anesthetic injections as shown in Figure 3 and treatment outcomes, our findings showed that SIJ injection is an effective treatment for SIJ pain, and that repeated injections may be needed in some patients.

Ineffective or recurrent cases may be required radiofrequency (RF) ablation. RF denervation of the joint itself or the medial branch, the L4 and L5 primary dorsal rami and S1-S3 lateral branches treatment options could be used in patients.<sup>4</sup> Also the results of systematic review by Hansen et al. demonstrated fair evidence for cooled RF neurotomy for long term pain relief and limited evidence for pulsed radiofrequency, and conventional radiofrequency neurotomy.<sup>1</sup>

As in our study, not only patients with idiopathic or traumatic SIJ pain benefit from SIJ block, but also patients underwent lumbosacral surgery can benefit from the positive effect of SIJ block. In the study of Bükür et al. comparing patients with and without fusion surgery, as SIJ block had a similar therapeutic effect on patients, they suggested that a different treatment method was not necessary for SIJ pain in patients with lumbosacral fusion surgery.<sup>22</sup> On the other hand, in the study of Liliang et al. patients with lumbar or lumbosacral fusion had a poorer response to the SIJ blocks compared to patients without fu-

sion.<sup>23</sup> Recently, Bronsard et al. also reported that the injection with 3D surgical navigation reduced SIJ pain after lumbosacral fusion.<sup>3</sup> The number and level of fusion of the patients, duration of pain, procedure technique or drugs used may have affected these results.

In the literature, there are a variety of SIJ injection techniques in terms of the type of local anesthetic and corticosteroid used in the procedures, and the injected volume (1 to 5 mL).<sup>24</sup> In a recent study, Yehia Kassim et al. concluded that no benefits were obtained from addition of dexmedetomidine to steroids in SIJ injection. There was no statistically significant difference between the steroid group and dexmedetomidine group in the scores.<sup>25</sup>

In addition to fluoroscopy guidance, ultrasound has also started to be used for SIJ intra- and periarticular injections. Ultrasound provides simultaneous imaging, does not pose a radiation risk, and provides better visualization of vascular and other structures. With ultrasound and fluoroscopic guidance, it is investigated whether the final needle position and the accuracy of the injectat location are equivalent.<sup>26</sup> Some studies reported that no difference was observed in using either ultrasound or fluoroscopy regarding mean Numeric Pain or ODI scores.<sup>27,28</sup> Injection without radiographic guidance has been reported to spread into sacral foramina, extension into the epidural space, and be vascular. Besides ultrasound and fluoroscopy, Farhoud et al. reported in their study which included 20 adults with SIJ pain due to different reasons and applied corticosteroids and local anesthetic, that computed tomography (CT) guided SIJ injection was a minimally invasive procedure and yielded good results by single injection to all patients during 6 months follow up.<sup>2</sup> On the contrary, some studies reported that ultrasound and CT guidance do not rule out intravascular flow and are not as effective in verifying intra-articular placement of the injectate.<sup>29,30</sup> Fluoroscopy is an easily accessible imaging method with less radiation risk and lower cost compared to CT. In the current study, SIJ injection procedures of all patients were applied under fluoroscopy guidance. We found a significantly important change in VAS and ODI scores after local anesthetic and corticosteroid injection into the SIJ.

Except for the classical method applied using a single needle Gupta reported a different technique for SIJ injection with double needle. This study suggested that the double needle technique improves the chances of successful intraarticular injection in a selected group of patients.<sup>31</sup> However, this technique can also increase the time needed to do the procedure, increase radiation exposure, and the chance of infection. In the current study, the injections were performed with the single needle technique with inferior approach.

The main limitation of our study was its retrospective nature. On the other hand, the control group was not needed as we compared the pre-and post-procedure results of the patients. The sample size could be larger. In addition, no serious injection-related complications or side effects were observed in our patients. Good long-term outcomes for a follow up period longer than six months could be achieved.

## CONCLUSION

In conclusion, this study retrospectively investigated the therapeutic benefit of intra-articular corticosteroid and local anesthetic injections into the sacroiliac joints. Management options of SIJ pain could be conservative, interventional or surgical. However, one of the most promising interventional methods is SIJ injection, which is difficult to access, it requires radiological guidance. There was a significant improvement in VAS and ODI scores at 1<sup>st</sup>, 3<sup>rd</sup>, and 6<sup>th</sup> month at follow-up. The VAS score one hour after injection was also significantly lower than the prein-

jection VAS score. Repeated injections could be needed in some patients. Radiofrequency denervation or surgical treatment may be considered as options in patients resistant to repeated SIJ injection. Although the accuracy of the diagnosis, the therapeutic effect of the medication and spread of injectate in the intra-articular space change the effectiveness of the injection, SIJ injections are widely used for diagnostic and therapeutic purposes.

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## Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

## Authorship Contributions

**Idea/Concept:** Derya Bayram, Dostali Aliyev; **Design:** Derya Bayram, Dostali Aliyev, Güngör Enver Özgencil; **Control/Supervision:** Derya Bayram, Güngör Enver Özgencil; **Data Collection and/or Processing:** Derya Bayram, Dostali Aliyev; **Analysis and/or Interpretation:** Derya Bayram, Dostali Aliyev, Güngör Enver Özgencil; **Literature Review:** Derya Bayram, Dostali Aliyev; **Writing the Article:** Derya Bayram, Dostali Aliyev; **Critical Review:** Derya Bayram, Dostali Aliyev, Güngör Enver Özgencil; **References and Fundings:** Derya Bayram; **Materials:** Derya Bayram, Dostali Aliyev.

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