Sakroiliac Joint Dysfunction in Patients with Failed Back Surgery Syndrome

Başarısız Bel Cerrahisi Sendromu Olan Hastalarda Sakroiliak Eklem Disfonksiyonu

Burcu Duyur Çakıt, Hakan Genç, Özlem Balaban, Barış Nacır, Hatice Rana Erdem

Sağlık Bakanlığı Ankara Eğitim ve Araştırma Hastanesi, 2. Fizik Tedavi ve Rehabilitasyon Kliniği, Ankara, Turkey

ABSTRACT

Objective: To evaluate the incidence of the sacroiliac joint dysfunction (SIJD) and determined the disability levels and difference of pain referral patterns in failed back surgery syndrome (FBSS) patients with or without SIJD.

Methods: Fiftythree patients with FBSS were enrolled the study. Patients were asked to draw the location and radiation of the postoperative pain and whether this location and radiation were different from preoperative pain or not. Pain was evaluated with Visual Analogue Scale (VAS). Disability was assessed using the Oswestry disability index (ODI) and Roland-Morris disability questionnaire (RDQ). Four widely accepted provocation tests for SIJD (Gaenslen's test, sacral sulcus tenderness, Yeoman's maneuver, and Patrick's test) were applied to all patients. The patients who were positive in all four provocation tests were determined to primary sacroiliac pathology as the source of back pain.

Results: Twenty two (group 2) of the 53 patients with FBSS demonstrated the positive response of four widely accepted maneuvers typically used to diagnose SIJD; 31 did not (group 1). No difference was seen between group 1 patients and group 2 patients with respect to VAS, ODI and RDQ values. The mean levels of ODI and RDQ were higher in patients with neurologic deficit ($p<0.01$).

Conclusion: This study shows that 41.5% of the FBSS patients have demonstrated SIJD symptoms and clinical findings. This study may attract attention of clinicians and surgeons from intervertebral disc to sacroiliac joint for the prevention of unneccessary back surgery. *(J PMR Sci 2010;13:25-30)*

Keywords: Sacroiliac joint dysfunction, failed back surgery syndrome, low back pain, etiology

ÖZET

Amaç: Başarısız bel cerrahisi sendromu (BBCH) olan hastalarda, sakroiliak eklem disfonksiyonunun (SİED) sıklığını araştırmak ve SİED'lu veya SİED'suz BBS'li hastaların dizabilite düzeyleri ve ağrı yayılım paternlerinin farkını ortaya koymaktır.

Yöntemler: Elli üç BBCS'lu hasta çalışmaya dahil edildi. Bir vaya birden fazla bel cerrahisi geçirmiş ancak konservatif tedviye rağmen ağrı ve fonksiyonlarda iyileşme olmamış hastalar çalışmaya dahil edildi. Hastalardan cerrahi sonrası ağrılarının lokalizasyonunu ve yayılımını tarif etmeleri ve bu lokalizasyon ve yayılımın preoperatif ağrıyla aynı olup olmadığını belirtmeleri istendi. Hastalar ağrı yoğunluğunu vizüel analog skala ile belirlediler (0-10). Dizabilite düzeyi Oswestry dizabilite indeksi (ODİ) ve Roland-Morris dizabilite sorgulaması (RDS) ile değerlendirildi. SIED için büyük oranda kabul görmüş dört provokasyon testinden (Gaenslen test, sakral sulkus hassasiyeti, Yeoman manevrası, ve Patrick test) dördünün de pozitif olması, bize bel ağrısının kaynağının sakroiliak eklem olduğunu gösterdi.

Bulgular: Yirmi iki (%41,5) (grup 2) hasta SİED tanısı için kullanılan dört testin dördü de pozitifti, 31 kişide ise değildi (grup 1). Grup 1 ve grup 2 hastalar arasında VAS, ODİ ve RDS değerleri açısından istatistiksel anlamlı fark yoktu ($p>0,05$). ODİ ve RDS ortalamaları, nörolojik defisiti olan grupta yüksekti ($p<0,01$).

Sonuç: Bu çalışma gösteriyor ki, %41,5 BBCS'li hasta, SİED'u semptomları ve klinik bulguları gösteriyordu. Bu çalışmadaki amacımız klinisyenlerin ve cerrahların, gereksiz cerrahilerden sakınmak için dikkatlerini intervertebral diskten sakroiliak ekleme çekmektedir. *(FTR Bil Der 2010;13:25-30)*

Anahtar kelimeler: Sakroiliak eklem disfonksiyonu, başarısız bel cerrahisi sendromu, bel ağrısı, etyoloji

Corresponding Author
Yazışma Adresi
Dr. Burcu Duyur Çakıt
Sağlık Bakanlığı Ankara Eğitim ve Araştırma Hastanesi, 2. Fizik Tedavi ve Rehabilitasyon Kliniği,
Ankara, Turkey
Phone: +90 312 595 34 05
Fax: +90 312 363 33 96
E-mail: burcudcakit@yahoo.com

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Introduction

The cumulative evidence of present time does not support routine surgical procedure for the treatment of chronic low back pain (1). Despite a careful selection of patients, the failure rate ranges from 10-30% (2). It has been shown that the size of herniations does not correlate with displayed clinical symptoms. The incidental finding of pathologic disc morphology is concluded to be the source of pain; because of this, wrong therapy such as nucleotomy may be initiated, leading to unsatisfactory postoperative results. Disc herniation leading to nerve root displacement with compression and causing radicular symptoms is only one of a variety of possible causes of lumbar and ischiadic pain. Pain radiating into the leg is not necessarily caused by irritation of the root. Sacroiliac joint (SIJ) was identified as one of the possible starting points of such complaints (3).

Failed back surgery syndrome (FBSS) is a clinical syndrome in which patients have persistent back and/or leg pain after one or more surgical procedures aimed at correcting their lumbosacral disease. It is characterized by intractable pain and various degrees of functional disability after lumbar spine surgery (4). The most common structural causes of FBSS are foraminal stenosis (25% to 29%), painful disc (20% to 22%), pseudoarthrosis (14%), neuropathic pain (10%), recurrent disc herniation (7% to 12%), iatrogenic instability (5%), facet pain (3%) and SIJ pain (2%) (4-6). Because there are many causes of FBSS, it is important to know the differential diagnosis to evaluate patients efficiently and to provide the most specific and effective form of treatment. The optimal treatment depends on an accurate diagnosis (2).

Sacroiliac joint dysfunction (SIJD) is an extraspinal cause of low back and lower extremity pain (7). The incidence of SIJD is estimated to be as large as 22% to 30% in centers that specialize in the treatment of low back pain. Etiologic factors implicated in the genesis of SIJD include trauma, cumulative injury, previous back surgery or idiopathic causes (2,8,9). The diagnosis is often complicated by discogenic pain or facet joint arthritis. These structures may refer pain to the SIJ or SIJD may develop as a result of adaptive changes (10,11).

Several studies have attempted to establish the prevalence of SIJD using history and physical examination findings. Bernard and Kirkaldy-Willis concluded that 22.5% of 1293 patients with low back pain were experiencing symptoms secondary to SIJD (11). In a few studies SIJD was identified as the pseudoradicular pain in 10-23% of patients following nucleotomy (3,12). Furthermore in a study of 183 patients with FBSS, 62.8% were suggested to demonstrate symptoms of the SIJ (13). SIJD is not well studied in FBSS patients.

The aim of this study was to evaluate the incidence of the SIJD in FBSS patients and determined the disability levels and difference of pain referral patterns in FBSS patients with or without SIJD.

Materials and Methods

Fifty three patients (9 men, 44 women) were enrolled in a prospective controlled study from February 2003 to October 2007. All included patients had given their informed consents before they were included in the study.

Patients were included in the study if they have had one or multiple previous lumbar surgeries but failed to improve satisfactorily despite a conservative treatment (physical therapy, balneotherapy, local anesthesia, pain medication include muscle relaxants, nonsteroidal anti-inflammatory drugs and gabapentin) of 6 months duration after their initial assessment. Patients were excluded from the study for any of the following reasons: major psychiatric comorbidity evident clinically or on routine psychological testing, presence of any other clinically significant disabling chronic pain and history of spondyloarthropathy, urethritis, peripheral arthritis, psoriasis or inflammatory bowel disease.

Demographic data obtained on FBSS patients included age, gender, duration of pain and history of trauma. Details of surgery and discectomy and/or laminectomy levels were recorded. Patients were asked to draw the location and radiation of the postoperative pain and whether this location and radiation were different from preoperative pain or not. Radiation sites of pain were grouped as abdominal, upper lumbar, lower lumbar, buttock, hip, groin, thigh, calf, ankle, and foot.

Patients were asked to report their average pain intensity over the previous week when completing the 0 (no pain)-10 (the worst pain) Visual Analogue Scale (VAS) for pain intensity. Disability was assessed using the Oswestry disability index (ODI) and Roland-Morris disability questionnaire (RDQ) (14).

All patients underwent detailed musculoskeletal and neurological examinations. Neurological deficits (reduced dermatomal sensitivity, diminished or absent tendon reflexes or motor weakness) including lumbar 3,4,5 (L3,4,5) and sacral 1 (S1) levels were noted.

Four widely accepted provocation tests for SIJD (Gaenslen's test, sacral sulcus tenderness, Yeoman's maneuver, and Patrick's test) were applied to all patients. The Gaenslen's test is performed with the patient supine on the examining table. One hip joint is maximally flexed,

whereas the other is maximally extended simultaneously. If the patient has posterior pelvic pain, the test considered positive. The Patrick's test stressed the hip and SIJ. The test is performed by moving the flexed, abducted and externally rotated hip to an extended position. If the test is positive, the patient describes pain at the posterior iliac spine and the SIJ. The Yeoman test is performed with the patient prone. The test is performed by extending the hip and rotating the ilium. Usually, the patient will report pain over the posterior SIJ (10). For all provocation tests, the test result was positive if the patient experienced their familiar pain. The test was negative if the patient experienced pain before full range was obtained, if the evoked pain was not characteristic, or if no pain was evoked (15). For the diagnosis, physical examination had to demonstrate a positive response to four widely accepted maneuvers typically used to diagnose SIJD. The patients who were positive in all four provocation tests were determined to primary sacroiliac pathology as the source of back pain.

Statistical Analysis

Data were analyzed with SPSS, version 16.0 for Windows. Spearman rank correlations were determined the relationship between disability scores and clinical findings. The Mann-Whitney U test and Chi Square test were performed to compare the groups. Results were reported as mean ± standard deviation. p values of <0.05 was reported as significant.

Results

The mean age of the patient population was 49.74±14.61 (range 25 to 74) years. There were 45 patients with one prior surgery, four with two, three with three and one with four prior surgeries. The mean disease duration was 79.2±27.86 (range 6 to 360) months of all patients.

Twenty two (41.5%) of the 53 patients with FBSS demonstrated the positive response of four widely accepted maneuvers typically used to diagnose SIJD; 31 did not. Patients who did not demonstrate the positive response to maneuvers comprised group 1, and those who demonstrate positive response comprised group 2. There were no statistically significant difference between group 1 and group 2 patients regarding age, gender, body mass index, disease duration and history of trauma (p>0.05). The demographic features and discectomy and/or laminectomy levels of groups are shown in Table 1.

Pain referral areas of the patients are summarized in Table 2. Group 1 patients described upper lumbar pain more frequently than group 2 patients (p=0.003). Group 2 patients complained calf, ankle and foot pain more frequently than group 1 patients (p=0.016, p=0.043, p=0.011, respectively). 20% of the group 1 patients and 48% of the group 2 patients pain referral areas didn't changed postoperatively. Lower lumbar and leg pain in group 2, upper lumbar and thigh pain in group 1 were more frequent complaints associated with low back pain.

There was statistically significant difference between group 1 and group 2 patients regarding presence of neurologic deficit. Neurologic deficits were more frequent in group 2 patients (p=0.001). No difference was seen between group 1 patients and group 2 patients with respect to VAS, ODI and RDQ values (Table 3). The mean ODI scores of group 2 patients was slightly higher than group 1 patients but it did not reach the statistically significant level. The mean levels of ODI and RDQ were higher in patients with neurologic deficit (p<0.01).

Table 1: The demographic features and discectomy and/or laminectomy levels of the groups

	Group 1	Group 2	p
Age (range)	52.2914.53 (25-74)	46.1414.27 (26-74)	0.145*
Gender (Male/Female)	3/28	6/16	0.096*
BMI (kg/m^2) (range)	27.66±5.31 (20-35)	27.01±4.35 (18-36)	0.753*
Disease Duration (month) (range)	78.68±15.34 (6-360)	78.57±17.73 (6-336)	0.166*
History of trauma n (%)	23 (74.2)	19 (86.4)	0.234†
Operation type n (%)	-	-	-
Laminectomy and discectomy	4 (12.9)	5 (22.7)	-
Discectomy	3 (9.6)	5 (22.7)	-
Laminectomy	9 (29)	4 (18.1)	-
Fusion	2 (6.4)	1 (4.5)	-
Unknown	13 (41.9)	7 (31.8)	-
Laminectomy and/or Discectomy level(s) n(%)			
L3-4	-	1 (4.5)	
L4-5	9 (29)	9 (40.9)	
L5-S1	22 (71)	8 (36.4)	
L3,4,5	-	3 (13.6)	
L4-5, L5-S1	-	1 (4.5)	

BMI: Body Mass Index
L: Lumbar
*Mann Whitney U test statistic
†Chi Square test statistic

There were significant correlations between ODI and presence of neurologic deficit and history of trauma (r=0.554, p=0.00, r=-0.497, p=0.0 respectively), and between RDQ and presence of neurologic deficit and history of trauma (r=0.368, p=0.007, r=-0.412, p=0.002).

Discussion

Maigne et al. (2) evaluated the frequency of SIJD in lumbar fusion patients with persistent postsurgical low back pain, with the use of anesthetic blocks under fluoroscopy. They included patients if they had tenderness of the sacral sulcus, no radiating pain below the knee and no evidence of lumbar cause. They discussed three possible reasons that could lead to SIJD: a mechanical load transfer on the sacroiliac joint after fusion, a consequence of bone graft harvesting in the iliac crest close to the joint, and the misdiagnosing of a SIJD before fusion. They concluded that within a selected population with postfusion low back pain, the SIJ is the likely source of pain in 35% of cases. In this study, we found that 41.5% of our patients have demonstrated SIJD signs and symptoms. We found that the pain referral areas in more than a half of our group 2 patients were not different from the presurgery pain referral areas and included lower back and leg regions. So we thought that the source of back pain in preoperative period in these patients was SIJ rather than intervertebral disc. This situation made us think that some of our patients may have undergone unnecessary surgical procedure. On the other hand nearly a half of our group 2 patients described upper back and thigh pain after surgery which may related to FBSS. So we thought that the SIJD was the important reason of the FBSS. Waguespack et al. (16) investigated foraminal stenosis and one or more painful discs accounted for almost one half of the patients of FBSS. They observed that, in many instances, the surgery that failed may not have been the best choice for the specific structural disorder, the preoperative diagnosis was incorrect or incomplete, or the surgery performed did not adequately correct the structural disorder. So, based on our findings, we thought that SIJD must be evaluated in preoperative period. It was also evaluated in post operative period in patient who developed FBSS.

Table 2: The frequency of pain distribution areas of the groups

	Group 1 n (%)	Group 2 n (%)	p*
Upper Lumbar	24 (77.4)	8 (36.4)	0.003
Lower Lumbar	23 (74.2)	20 (90.9)	0.118
Hip	18 (58.1)	18 (81.8)	0.062
Groin	13 (41.9)	10 (45.5)	0.510
Thigh	25 (80.6)	18 (81.8)	0.602
Calf	19 (61.3)	20 (90.9)	0.016
Ankle	19 (61.3)	19 (86.4)	0.043
Foot	13 (41.9)	17 (77.3)	0.011

*Chi Square test statistics

Table 3: The mean values of visual analogue scale (VAS), Oswestry disability index (ODI) and Roland-Morris disability questionnaire (RDQ) of the groups.

	Group 1	Group 2	p
VAS (range)	6.161.5 (4-10)	6.261.44 (4-9)	0.695*
Presence of	11 (35.5)	18(81.8)	0.001†
Neurologic Deficit n (%)			
ODI	38.6117.57 (16-74)	43.017.66 (16-80)	0.347*
RDQ	16.355.38 (8-24)	17.324.3 (7-24)	0.486*

*Mann Whitney U test statistic
†Chi Square test statistic
VAS: Visual Analogue Scale
ODI: Oswestry Disability Questionnaire
RDQ: Roland-Morris Disability Questionnaire

The SIJ's variable innervation may result in complex symptom referral. Varying sclerotomal pain referral patterns may also arise from injury to distinct locations in the SIJ. Additionally, the piriformis muscle, situated in close proximity to the sacroiliac joint, may be affected by intrinsic joint pathology, resulting in pain of muscular origin and/or associated sciatic nerve irritation (7). Therefore, pain arising from the SIJ may radiate various anatomic regions including the buttocs, the groin and the entire lower limb. If the pain is referred above the fifth lumbar level, it is unlikely that the SIJ is the source of pain. In patients with SIJD, it can be expected that the pain referral pattern includes an area extending 10 cm caudally and 3 cm laterally from the posterior superior iliac spine (10). Slipman et al. (7) described that 94% of their patients had described buttock pain 72% lower lumbar pain, 50% lower extremity pain, 28% leg pain distal to the knee and 14% foot pain. Accordingly with Slipman et al.'s findings, we found that lower lumbar and leg pain were more frequent in our SIJD patients.

Slipman et al. (17) found that the positive predictive value of positive response to three provocative SIJ maneuvers (two of which had to be Patrick's test and pain with palpation over the ipsilateral sacral sulcus) in determining the presence of SIJD is therefore 60%. They concluded that the provocative SIJ maneuvers may not confirm the diagnosis of SIJS. These physical examination techniques can enter SIJD into the differential diagnosis. Symptom location can suggest the SIJD diagnosis is a

possibility. Fortin (18) suggested that, if pain emanates from or includes the sacral sulcus, SIJD should be enter into differential diagnosis. Although intraarticular injection of the SIJ is a useful technique in establishing the SIJ as a source of pain and can be considered the diagnostic gold standard for SIJD, in a recent review, Zelle et al. (10) reported a treatment algorithm that consisted of a thorough clinical examination that, they offered, all patients presenting with clinical symptoms should undergo. They recommended a combination of different clinical SIJ tests in order to reliably establish the SIJ as pain source. If the clinical evaluation suggests SIJD, the patient enrolled in a 6 week program of physical therapy. In those patients who do not respond to nonoperative treatment methods, a CT-guided local anesthetic/steroid injection is indicated in order to establish the SIJ as the primary source of pain and the treatment method. Similarly van der Wurff et al. (15) suggested that when the 3 or more positive provocation tests are positive, the probability is between 65% and 93% that the pain is related to the SIJ. They reported that it can be used in early clinical decision making to reduce the number of unnecessary invasive diagnostic SIJ procedures. Kokmeyer et al. (19) suggested that a multitest regimen of 5 SIJ pain provocation tests (distraction, compression, Gaenslen test, Patrick sign and thight trust) is a reliable method to evaluate SIJD. Thus, multiple positive provocation tests strongly indicate SIJD in the differential diagnosis of LBP (20,21). In our study, patients who had four positive reliable provocative tests were selected. According to Dreyfuss et al. (21), sacral sulcus tenderness was the most sensitive test for detecting SIJD. In our study, all group 2 patients had sacral sulcus tenderness as well as other provocation tests and their main complaint was pain which localized over the sacral sulcus and lower lumbar region, rather than the upper lumbar area. So we used four widely accepted provocative tests for diagnosing SIJD. One of the drawback of our study is that we didn't perform the sacroiliac injection for the diagnosis and the treatment, but according to treatment algorithm as mentioned above, sacroiliac injection is not the first recommended diagnostic tool for SIJD. So, we believe that we selected appropriate patients as SIJD group.

In the studies which were used intraarticular SIJ block as a diagnostic tool, some of the exclusion criteria were lumbar disc herniation, positive root tension signs, lumbar spinal stenosis, neuromuscular defisits and lumbar instability (7,8,15,22) and a 75-80 percent decrease in the VAS rating score was accepted as a positive response to SIJ block (7,15,22). On the contrary, these signs and symptoms were the inclusion criteria of our study. So, we couldn't reach these percentage of pain relief in our patients because of their lumbar pathologies. Cheng et al. found that patients with SIJD who had back surgery previously had higher disease durations and lower postinjection analgesia times after diagnostic SIJ block (8).

We did not find any differences between FBSS patients with and without SIJD regarding back-pain specific health status measures. Cheng et al. (8) assessed the intensity and health related quality of life in patients with SIJD and compared to patients with lumbar radiculopathy. They didn't found any statistical difference between patients with SIJD and lumbar radiculopathy with respect to McGill pain scores, visual numerical pain scores and SF-36 health related quality of life measure. Kovacs et al. (23) have suggested that health related quality of life is correlated with pain an disability rather than with etiology of low back pain. Cheng et al. (8) suggested that the construct of diagnostic categories of low back pain may not be a determinant of health related quality of life. They also found that no difference in pain scores between patients with SIJD and lumbar radiculopathy. They showed that the quality and intensity of pain was statistically similar between SIJD and lumbar radiculopathy. Accordingly with them we didn't found any differences in pain scores between patients with and without SIJD. We thought that FBSS itself was painfull and disabling condition and SIJD is only a causative factor for FBSS. So SIJD may not be a determinant for disability and pain intensity in FBSS.

Chou et al. (9) found that 44% of SIJD patients in their study had had a traumatic event, 21% had had a cumulative injury, and 35% had had a spontaneous oncet of SIJ pain. But in our study, there is no statistically significant difference between group 1 and 2 patients regarding history of trauma or heavy lifting as an inciting events.

In conclusion, our study shows that 41.5% of the FBSS patients have demonstrated SIJD symptoms and clinical findings. But it is not confirmed with a diagnostic SIJ block. Despite the methodologic drawbacks, this study may attract attention of clinicians and surgeons from intervertebral disc to sacroiliac joint for the prevention of unneccessary back surgery.

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