

Fluoroscopy Guided Intra-Articular Corticosteroid Infiltration for Sacroiliac Joint Arthropathy

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Abstract: ***Introduction:** Sacroiliitis represents the hallmark of spondylarthritis and manifests as gluteal pain associated with morning stiffness (MS). Non-steroidal anti-inflammatory drugs (NSAIDs) and disease modifying drugs (DMARDs) not only mandate longer duration of treatment but also proves unsatisfactory in achieving a remission. Literature on clinical outcome of sacroiliac joint injection (SIJI) with methylprednisolone is less available. **Materials and methods:** We enrolled patients presented with pain due to sacroiliitis confirmed via magnetic resonance imaging (MRI) and managed with intra-articular injection of methylprednisolone, hyaluronidase, and bupivacaine at sacroiliac joint (SIJ) under fluoroscopy guidance. Pre-and-post intervention numerical rating pain score (NRPS) and Oswestry disability Index (ODI) was recorded and analyzed. **Results:** We enrolled 31 patients, mean age 55 ± 22 years; 20 females and 11 males; mean duration of sacroiliitis 36.82 ± 12 months; 94% patients were on NSAIDs; 6% on NSAIDs and DMARDs; over all 52 SIJ injected; Preoperative mean NRS and ODI was 6.5 ± 1.2 and 70.6 ± 10.2 respectively. Postoperative median NRS and ODI on day 7, month 1 and month 3 were 3.5, 3.1 and 2.2; and 20.6, 18.1 and 18.5 respectively. Statistically significant drop in NRS and ODI observed ($p < 0.001$) between the baseline and every subsequent follow-up visit. **Conclusions:** Targeted fluoroscopy guided SIJI with methylprednisolone, hyaluronidase and bupivacaine yielded remarkable pain relief and improved quality of life in patients with sacroiliitis refractory to conservative therapy.*

Keywords: Sacroiliitis, Numerical Rating Pain Score, Oswestry Disability Index, Fluoroscopy, Sacroiliac joint injections.

1. Introduction

Sacroiliac arthropathy is a painful inflammatory condition of the sacroiliac joints (SIJs) often linked to the arthritis of the spine and considered as a hallmark of seronegative spondyloarthropathies [1, 2]. Clinical manifestations include pain over lower back and gluteal region associated with morning stiffness (MS). Intensity of pain varies with the degree of inflammation at SIJ. Trigger point being nociceptive receptors at SIJ, the pain signals are carried by dual nerve supply (ventral and dorsal) carried S1 to S4 lateral branches of dorsal ramus and medial branches of L4 and L5. Pathophysiology of sacroiliitis is complex. Environmental, immunological, and genetic factors attribute to the prevalence of Sacroiliitis. Inflammatory bowel disease, Crohn's disease, gout, tuberculosis, brucellosis, and osteoarthritis, are the common etiological factors.

Sacroiliitis adversely affect the quality of life, often leading to an increase in disability and an overall well-being. Though, non-steroidal anti-inflammatory drugs (NSAIDs) and biological disease modifying drugs (bDMARDs) remains to be main line of management, it not only proves unsatisfactory in achieving remission in a subset of patients, but also cause adverse drug reaction. Affordability and eligibility for immunosuppressive therapy is a concern too. Patients with infective disorder and history of neoplasia are incompatible for bDMARDs [3]. Corticosteroid injections represent a useful tool for managing mono- and oligoarthritis in rheumatological and pain practice.

Computerized tomography, or MRI guided SIJI are being studied and found to be reliable technique in terms of

precision, but are burdened by intrinsic risks and limitations such as radiation, high cost, infrastructure. Fluoroscopy and Ultrasound has been relatively a low-cost and safe-to-use alternative that can be used to correctly visualize SIJs and therefore be applied when performing SIJIs. In this background, we conducted an observational study aimed at establishing the efficacy of Fluoroscopic guided corticosteroids sacroiliac joints infiltrations (SIJIs) for patients with painful Sacroiliitis.

2. Materials and Methods

***Study design and population:** Retrospective study of all consecutive patients with painful Sacroiliitis who underwent Fluoroscopy guided SIJI from December 2024 to May 2025 were enrolled.*

***Data collection:** Demographic details, presenting complaints, duration of symptoms, numerical pain rating score (NPRS), Oswestry disability index (ODI), X-ray and MRI of Thoraco-Lumbar spine and Sacroiliac joint, routine blood workup, coagulation profile and viral screening recorded. Duration of procedure, Anesthesia given, intraoperative complications, post-operative NPRS and ODI score, post-operative complications, time to mobilize post-operatively and duration of hospital stay were collected and recorded in SPSS software.*

***Fluoroscopy and target localization technique:** Standard ASA monitoring attached to the patient in the operation theatre. Patient positioned in prone. Sterile prep and draped. Inferior approach followed. In anteroposterior (AP) view, posterior as well as anterior joint margin identified and posterior superior*

iliac spine. Contralateral oblique tilt of C-arm to overlap anterior and posterior joint margins. 22G Quincke (15cm) spinal needle inserted through the caudal edge of the joint. About 0.5-1ml of Iohexol dye injected to confirm the SIJ (Figure 1). A mixture of 80mg Methylprednisolone, 1500U hyaluronidase and 1 ml of 0.5% Bupivacaine injected. Drug spread was confirmed with C-arm.

Statistical analysis: All the statistical analyses were conducted using IBM SPSS Statistics 27. Continuous variables were summarized using mean, median assessed by the Shapiro-Wilk test. Within-group comparisons of NPRS and ODI scores across the four time points by the Friedman test. When significant, pairwise comparisons between time points by Wilcoxon signed-rank test with Bonferroni correction for multiple comparisons.

3. Results

We enrolled 31 patients, mean age 55 ± 22 years; 20 females and 11 males; mean duration of sacroiliitis 36.82 ± 12 months; 94% patients were on NSAIDs; 6% on NSAIDs and DMARDs; over all 52 SIJ injected.

Table 1: Baseline characteristics of study population

Parameters	Values
n	31
Male: Female	20:11
Age	55.22 ± 22 years
Disease duration	36.82 ± 12 months
Diagnosis (n)	
Osteoarthritis	12
Degenerative	8
Ankylosing spondylitis	4
Repetitive Trauma induced	3
Post spinal surgery	2
Inflammatory Bowel Disorder	2
NSAIDs	> 94%
bDMARDs + NSAIDs	6%
NRPS (baseline)	6.5 ± 1.2
ODI (baseline)	70.6 ± 10.2

n: number of patients, **SIJIs** Sacroiliac Joint Injections, **NSAIDs** non steroids inflammatory drugs, **bDMARDs** biological disease modifying anti-rheumatic drugs, **NRPS** numerical rating pain score, **ODI** Oswestry Disability Index. The technique of Fluoroscopy guided SIJ is illustrated in the figure 1.

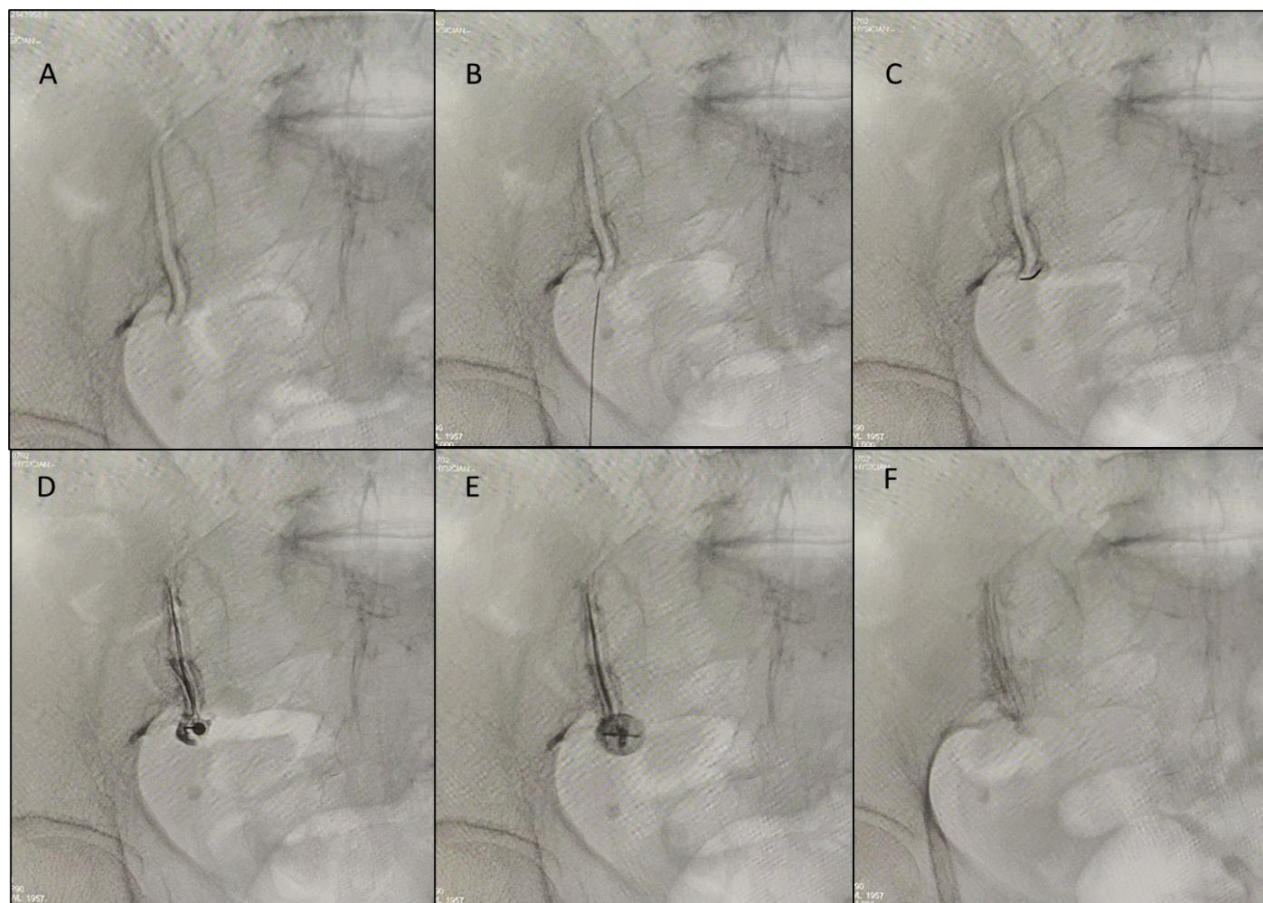


Figure 1: Targeted corticosteroid injection at Sacroiliac joint by Fluoroscopy

A- Aligning anterior and dorsal joint line in contralateral oblique view, **B & C** – 22G Quincke needle entry at caudal edge of SIJ, **D-** Iohexol dye injection, **E-** Methylprednisolone Injection into SIJ, **F-** Post-injection status

Statically significant reduction in NRPS and ODI observed in 1 week post intervention at SIJ ($p < 0.001$). During subsequent follow up, NRPS and ODI was maintained low

throughout the study period (Figure 2). Moreover, a reduction in the use of NSAIDs was documented after the SIJ.

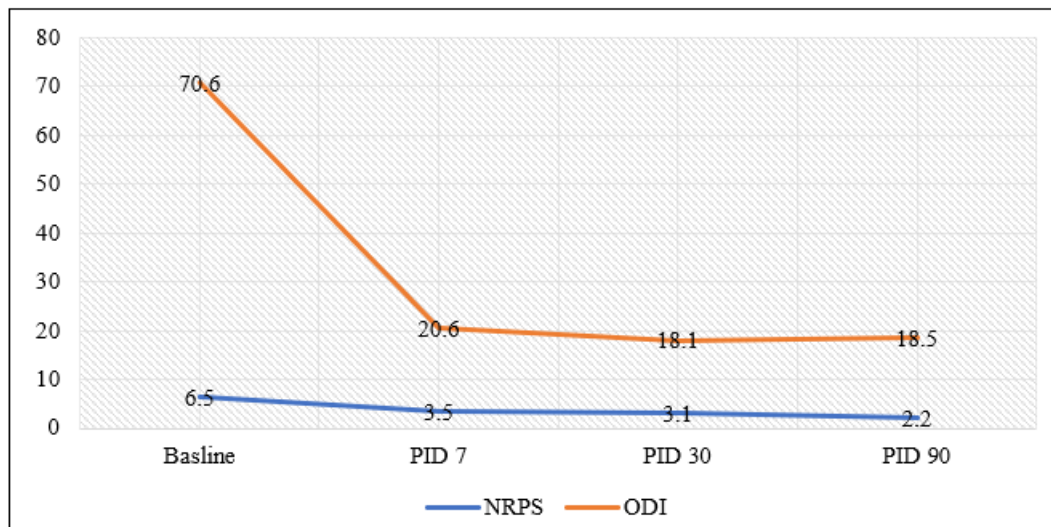


Figure 2: Comparing pre-and-post Sacroiliac joint injection NRPS and ODI

NRPS-Numerical rating pain score, **ODI**- Oswestry Disability Index, **PID**- Post intervention day

4. Discussion

Literature show that Sacroiliitis is associated with disability and a reduction in quality of life. Often, treatment with NSAIDs and bDMARDs fails to cause low disease activity or remission. Recent studies summarize the ultrasonography (USG), fluoroscopy, MRI, or CT testified their efficacy in managing Sacroiliitis [7]. In our research, the effect of fluoroscopy-SIJs on active sacroiliitis was rapid in improving patients' symptoms and in restoring a good quality of life. A previous study on USG versus Fluoroscopy guided SIJs demonstrated a high accuracy in reaching the synovial recess of a joint by Fluoroscopy [8]. However, the USG-SIJI approach allowed aiming a target and following a needle during a procedure, thus increasing the accuracy and effectiveness of treatment.

In our experience, 1 week after receiving SIJs, patients reported a 71% overall reduction of ODI and 48% of NRPS which is statistically significant. Such effect was maintained throughout the study period of 3 months. Immediate pain relief and improved quality of life could be because of the synergistic action of Bupivacaine and Methylprednisolone. Literature show that particulate steroid has longer duration of action as compared to non-particulate steroids.

Ramirez et al, showed that the highest efficacy of USG-SIJs was reached 14 days after treatment, while visual analogue scale pain dropped by 61% after 2 weeks compared to the baseline and it lasted up to 6 months; and there was a persistent reduction of 33% at end of the study[9]. We found similar results with morning stiffness: a significant pain reduction in the group of patients treated with SIJs was documented after 7 days, and this reduction reached its highest level in the third month after the administration of SIJs.

Although these results are in line with the literature [5, 10, 11], to the best of our knowledge, this is the key study which has documented a rapid reduction in NRPS and ODI in association with their long lasting effects. The persistent reduction of the tested variables could be partially attributable to the NSAIDs and bDMARDs therapy which was continued

till the end of study. In fact, none of our patient had sought for analgesics for breakthrough pain during the study. A few patients had reported to have skipped daily NSAIDs and bDMARDs though Spondyloarthritis is a chronic disease which requires a life-time immunosuppressive regimen and cycling as advised by Rheumatologists.

Furthermore, several studies have documented the efficacy of SIJI in reducing bone marrow oedema, based on MRI [12, 13]. Therefore, SIJs may produce an immediate *disease modifier* effect due to its local anti-inflammatory action. whereas, bDMARDs are effective in modifying the course of disease although their effect is slow and requires a few months (3–6 months) to benefit the patients. Active neoplasia of 5 years duration and infections still represent an absolute contraindication to the use of bDMARDs. Therefore, treating such patients is a challenge for Rheumatologists, but an interventional pain physician can help with Fluoroscopy -SIJI for immediate pain management. Further, NSAIDs is the cornerstone for treatment of spondylarthritis [14] and hence used as a first-line therapy. However, dangers to the use of NSAIDs are gastrointestinal, cardiovascular, and renal impairment [9]. Thus, NSAIDs should always be used with caution—especially in fragile patients.

5. Study Limitations

The present study has several limitations such as small sample size, non-homogenous study population, absence of control arm, short follow-up of patients, single center study. Post intervention MRI could have documented the real effectiveness of SIJs and modifications in bone marrow oedema, if any. Nevertheless, the main strength of this paper: is that SIJs could benefit patients experiencing heterogeneous disease stages.

6. Conclusions

In the present study, we show that Fluoroscopy guided steroid injection at SIJ is safe and effective for SIJ arthropathy; and believe that all intervention pain physicians would practice Fluoroscopy guided SIJI for managing painful Sacroiliitis to alleviate pain and improve quality of life of patients.

Declarations

Conflict of interest: The authors deny any conflict of interest.

Funding: The authors deny any funding.

Ethical Statements: The present study was approved by a local ethical committee and conducted in accordance with the Declaration of Helsinki and its late amendments.

Informed consent: The infiltrative technique was explained to the patient and a written informed consent was obtained.

Consent to publish: Each patient provided written informed consent to be enrolled.

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