Particulate Corticosteroid Versus Non-particulate Corticosteroid for Sacroiliac Joint Injection
NCT03166761

Protocol and SAP

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Randomized prospective study of particulate corticosteroid versus non-particulate corticosteroid for sacroiliac joint injection

Background and Significance

In spinal Intervention dexamethasone has been found to be non-inferior to particulate corticosteroids such as methylprednisolone. Despite this, there is a theoretical benefit of particulate steroids as they are assumed to remain in the site of injection for a longer duration. Whether or not such difference in effectiveness has not been studied in intra-articular injections. In spine injections specifically, this has not been evaluated in the sacroiliac joint steroid injections.

Sacroiliac joint injections are frequently employed as a treatment for suspected sacroiliac joint pain. Success rates for these injections range widely, from 18% to 62% (1). Nearly all outcomes studies of sacroiliac joint corticosteroid injection utilize preparations of particulate corticosteroid. No reports of neurologic infarction or other catastrophic complications have been reported following sacroiliac joint injection with any form of steroid.

According to current Spine Intervention Society Guidelines, sacroiliac joints should be done with the use of image guidance including contrast administration with real-time fluoroscopy. If vascular uptake is appreciated during this, it is recommended the needle be repositioned. Vascular uptake is relatively frequent, with reports of an incidence of 5.3% (2) There are occasions wherein despite multiple attempts at needle repositioning, vascular uptake persists. In such cases, there is at least theoretical increased risk in administering particulate steroid and because of this the procedure may be cancelled. An alternative to avoid this risk/complication or procedure termination would be administration of a non-particulate steroid. However, no evidence exists to support the practitioner in determining if injection of the non-particulate corticosteroid dexamethasone has equal effectiveness compared to particulate preparations of corticosteroid.

Hypothesis

Null Hypothesis: There is no difference in percentage of patients with sacroiliac joint pain as confirmed by positive anesthetic response (80% relief immediately after injection) to sacroiliac joint steroid injection that achieve moderate or good response (at least 50% improvement in numeric pain rating scale) between those receiving sacroiliac joint corticosteroid injection of 40mg of methylprednisolone and those receiving 10mg of dexamethasone at 4 weeks and 3 months.

Specific Aims:

1. Compare the proportion of patients between groups with a good response (80% or greater improvement in index pain) after sacroiliac joint corticosteroid injection at 2-4 weeks and 3 months.

2. Compare the proportion of patients between groups with a moderate response (50% or greater improvement in index pain) after sacroiliac joint corticosteroid injection at 2-4 weeks and 3 months.
3. Compare the proportion of patients between groups who have at least 30% improvement in ODI at 2-4 weeks and 3 months
4. Compare the proportion of patients between groups who have ODI score less than 20% at 2-4 weeks and 3 months.
5. Compare the proportion of patients between groups who had a good response at 2-4 weeks that continue to have good response at 3 months
6. Compare the proportion of patients between groups who had a good response at 2-4 weeks that continue to have at least moderate response at 3 months.
7. Compare the number of patients who have at least moderate response at 2-4 weeks who require repeat injection prior to 3 months.
8. Compare the number of patients with cessation of pain medication use, other than over-the-counter medication, for index pain at 2-4 weeks and 3 months
9. Report Adverse Events

Recruitment Process
Identification of potential study participants on day they arrive to outpatient surgery center based on the treatment room's schedule.

Enrollment Process
Potential candidates will be approached on the day of their scheduled sacroiliac joint steroid injection with a presentation by a physician or research assistant. Eligibility will be determined by interview by physician or research assistant based on inclusion and exclusion criteria. Informed consent of qualifying volunteers will be obtained verbally and in written form.

Inclusion Criteria:

- aged >18, capable of understanding and providing consent in English, capable of complying with the outcome instruments used, capable of attending all planned follow up visits
- unilateral low back/buttocks pain of at least 2 weeks.
- Patient reported 7 day average of numeric pain rating score (NPRS) low back/buttocks pain of at least 5/10 at baseline evaluation
- Clinical diagnosis of sacroiliac joint pain as diagnosed by a board certified Physiatrist including history of low back/buttocks pain and at least 2 positive physical exam findings (including positive fortin finger sign, pain with palpation of posterior superior iliac spine, positive FABER's test, positive Gaenslan's test, positive sacral distraction, positive thigh thrust, positive lateral compression, positive sacral thrust)
- Patient consents to sacroiliac joint corticosteroid injection in a shared decision-making process with the treating physician.

- 80% or more relief of index pain within first 5-15 minutes after injection

Exclusion Criteria:

- Clinical suspicion of alternative process is greater than clinical suspicion of sacroiliac joint pain
- Those receiving remuneration for their pain treatment (e.g., disability, worker's compensation).
- Those involved in active litigation relevant to their pain.
- Those unable to read English and complete the assessment instruments.
- Those unable to attend follow up appointments
- The patient is incarcerated.
- History of prior sacroiliac joint fusion
- Progressive lower extremity neurologic deficit (from active radiculopathy, unhealed radiculopathy, or neuromuscular disease)
- Sacroiliac joint steroid injection within the prior 12 months
- 2 Positive lumbar medial branch blocks within the past 12 months
- Radiofrequency ablation of the lumbar spine within the past 12 months
- Lumbar facet steroid injections within the past 12 months
- Prior epidural steroid injection within the prior 3 months in any location within the spine.
- Possible pregnancy or other reason that precludes the use of fluoroscopy.
- Allergy to steroid, contrast media, or local anesthetics.
- BMI>40.
- Systemic inflammatory arthritis (e.g., rheumatoid arthritis, ankylosing spondylitis, lupus).
- Active infection or treatment of infection with antibiotics within the past 7 days.
- Medical conditions causing significant functional disability (e.g., stroke, decompensated COPD, decompensated heart failure)
- Chronic widespread pain or somatoform disorder (*e.g.* fibromyalgia).
- Addictive behavior, severe clinical depression, or psychotic features.

Outcome Instruments

(The baseline examination and all baseline questionnaires will be completed within 2 weeks before the first injection).

- Location of pain
- Duration of pain
- Demographics
- BMI

Baseline
Follow-up
- Adverse effects
-

Baseline and Follow-up
- NPRS back/buttocks pain (7-day average)
- Oswestry Disability Index (ODI)

Injection Treatment

Based on clinical evaluation patients will be scheduled for a unilateral fluoroscopic guided sacroiliac joint steroid injection. On arrival to the procedure center eligible patients will be enrolled and consented. Patients will then be randomized to receiving sacroiliac joint steroid injection with 1 cc of 2% lidocaine and either 40mg Methylprednisolone (40mg/cc) vs 10mg dexamethasone (10mg/cc)

All injection for this protocol represent different variations all of which fall within the realm of standard of care.

Sacroiliac Joint Steroid injection:
- date of injection recorded
- side of injection (right or left)
- Needle as preferred by physician
- Oral anxiolysis with low dose benzodiazepine as determined by physician
- Local anesthetizing of skin as determined by physician not to exceed 2 cc of superficial 1% lidocaine
- Technique as determined by 2013 International Spine Intervention Society Practice Guidelines: patients will be prepped in sterile fashion with alcohol based antiseptic and sterile drapes. Patients will be positioned prone on the table. Access to the sacroiliac joint will be done. Using multiple fluoroscopic view including alternating lateral obliquity and cranio-caudal tilt, a spot 1-2 cm cephalad of the inferior posterior margin of the joint will be identified as the target. The needle with then be advanced in this view towards to target point until the sacrum is contact. The needle will then be withdrawn and slightly redirected into the joint space until loss of bony resistance is felt. Depth will then be confirmed via a spot lateral fluoroscopic view. Once needle position has been confirmed in both oblique and lateral view, minimal volume of contrast (0.2-0.5 cc of Omnipaque 300) will be administered through extension tubing under real-time fluoroscopy to ensure intra-articular placement and to rule out vascular flow pattern. Extension tubing will then be removed. The injectate of 1cc of 2% lidocaine and 1cc of either 10mg dexamethasone or 40 mg methylprednisolone will then be administered. The procedure can be abandoned at any time at the discretion of the physician or patient. Patients will be observed for 15 min post

procedure in the procedure center recovery area and monitored for complications.
- Immediate relief of index pain will be documented prior to discharge

Power Analysis

A total of 102 patients (51 dexamethasone and 51 methylprednisolone) will provide over 80% power to detect a difference of 20% between groups in the proportion of patients achieving at least moderate improvement on the NPRS using repeated measures binary logistic regression with a level of significance of $\alpha = 0.05$. This calculation is based on previous literature showing the proportion of patients achieving at least moderate improvement to be roughly 50% (1). Additionally, this calculation conservatively assumes moderate autocorrelation among the time points and includes an extra 15% to account for potential loss to follow up.

Data Analysis
Descriptive statistics will be presented as frequencies and percentages for categorical variables and means and 95% confidence intervals for continuous variables. Differences in baseline demographics and clinical characteristics between groups will be assessed with chi-squared or Fisher's exact tests for categorical variables and independent samples t-tests or single factor ANOVAs (or the nonparametric equivalents) for continuous variables.

Study Timeline:
Baseline:
Participants who meet inclusion and exclusion criteria will be enrolled into the study after consenting to and before receiving a sacroiliac joint steroid injection. The baseline examination and all baseline questionnaires will be completed within 2 weeks before the first injection. Patients will be evaluated within 15 minutes after the injection to determine if they achieve self-reported measure at least 80% improvement after injection. Failure to achieve at least 80% relief results in a patient being removed from the study due to failure to achieve the final enrollment criteria. This is based on evidence that there is 100% negative predictive value of a negative anesthetic response in predicting 100% pain relief at 2-4 weeks and and 84% negative predictive value of a negative anesthetic response in predicting at least 50% relief at 2-4 weeks (Kennedy and Schneider publication pending)

Follow-up:
Routine scheduled follow-up will occur at 4 weeks (+/- 1 week) and 3 months (+/- 2 weeks) at which times all follow-up measures will be obtained. All patients will follow-up with the primary investigator who performed the injection.

This study is intended to compare outcomes at 2-4 weeks and 3 months following an initial sacroiliac joint steroid injection. The patient's first injection will define the study start date and the outcome assessment timeline for that respective patient. During the 3 months from this start date, a participant may receive one additional injection per protocol, at which point the follow-up schedule will revert back to the beginning, starting with the 4 week time point and continuing up to the final 3-month follow-up. Repeat injection will be with the same steroid the patient initially randomized to. Only one additional injection is allowed within the protocol.

Study Protocol

Patients are divided into 2 groups based on randomization that occurs on the day of the first injection. Pre-procedural data categorization will be entered at the time of group assignment.

Repeat Injection Criteria:

An patient who achieves at least 80% relief immediately after the injection and subsequently reports less than moderate relief (<50% relief on NPRS) at any point in the study will be offered repeat sacroiliac joint steroid injection. Repeat injection will be performed on the same side(s) as the initial injection and with the same steroid the patient was initially randomized to. If any additional injections are deemed warranted by the treating physician the patient will be considered a treatment failure in the study.

Injection: Unilateral or bilateral Injection will be allowed at the discretion of the treating physician.

Co-Intervention:

Patients are allowed to receive usual care, including co-interventions, as deemed necessary by the treating physician.

Primary Outcomes:

The primary outcome is comparison of successful treatment rates between groups at 2-4 weeks as defined as moderate or good response to treatment (at least 50% improvement in index NPRS pain) at 2-4 weeks follow up. Other comparisons between groups based on NPRS outcomes include categorical comparison of:

1. Moderate or good response at 3 months
2. Number of injections needed to achieve moderate or good response at 3 months.

Secondary Outcomes:

1. Disability (ODI)

Data Management

Data will be collected on standardized case report forms and entered into a database on HIPPA-compliant encrypted Vanderbilt laptop(e.g. Microsoft Excel) All study-related hard copy materials will be stored in locked file cabinets.

Analysis

Results of this randomized prospective pragmatic trial will be primarily determined by comparative analysis of comparative data at 4 weeks and 3 months. Overall success as defined by at least moderate response (at least 50% improvement on NPRS at 4 weeks and 3 months will be calculated for the entire cohort. No cross over will be allowed. Intention to treat analysis will be used. All adverse events will be recorded and reported.

1. Kennedy DJ, Engel A, Kreiner DS, Nampiaparampil D, Duszynski B, MacVicar J. Fluoroscopically Guided Diagnostic and Therapeutic Intra-Articular Sacroiliac Joint Injections: A Systematic Review. Pain Med Malden Mass. 2015 Aug;16(8):1500–18.

2. Sullivan WJ, Willick SE, Chira-Adisai W, Zuhosky J, Tyburski M, Dreyfuss P, et al. Incidence of intravascular uptake in lumbar spinal injection procedures. Spine. 2000 Feb 15;25(4):481–6.