

Facet Joint Injections in Patients with Low Back Pains and Facet Arthropathies - Our Experience

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ABSTRACT

BACKGROUND

Chronic back pain is a common and frequent clinical presentation in any population. Presence of disc disease, facet syndrome, and vertebral body disease are usually addressed by the radiologists. Facet joints are proven to be the culprit in 15 – 45 % of patients with low back pain. We wanted to compare effectiveness of fluoroscopy and computed tomography guided lumbar facet injections for pain relief in patients with facet arthropathies and mild canal stenoses.

METHODS

This is a retrospective cross-sectional study performed in the Department of Radiology at our Hospital in Dhahran. This record-based study was performed in our department from Jan. 2015 - 2020. All patients (N = 112) who underwent fluoroscopy and computed tomography (CT) guided facet injections (either alone or with epidural injections) for relief of chronic back pains (due to facet arthropathies and mild canal stenoses) were included, and grouped as (i) facet injections under fluoroscopy (F), and (ii) facet injections under CT guidance (C). Patients with acute disc prolapse, trauma to spine, lumbar surgeries, moderate to severe lumbar stenoses, spondylolisthesis, known systemic arthritides, those not suitable for the procedures, and those lost to follow-up were excluded. Repeat procedure within one year for recurrent complaints was used as a measure of effectiveness of the procedure. Proportional Z-test was used, and a p-value less than 0.05 was considered to be significant.

RESULTS

Out of a total of 112 patients, 64 were females (57 %) and 48 were males (43 %). The mean age was 56.4. Twenty out of 78 patients with facet injections under fluoroscopy and 3 out of 34 patients with facet injections under CT underwent repeat procedures (P = 0.042).

CONCLUSIONS

CT guided facet injections combined with epidural injections may be more effective in relief of lower back pain in patients with facet arthropathies and mild canal stenoses.

KEY WORDS

Computed Tomography, Facet Block, Epidural Injection, Canal Stenosis

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BACKGROUND

Chronic back pain is a common and frequent clinical presentation in any population.¹ It poses a diagnostic and therapeutic challenge due to multiple factors, overlapping clinical features and nonspecific radiological findings. The incidence of chronic back pain is at least 5 % per annum, with an average prevalence of about 15 % in adults.¹ The association between symptoms and imaging findings is weak in such cases, therefore, many patients remain undiagnosed and continue to suffer pain. Structures that may cause low back pain include the vertebral body, inter-vertebral discs, the spinal cord, nerve roots, facet joints, ligaments, muscles, and sacroiliac joints.² Presence of disc disease, facet syndrome, and vertebral body disease are usually addressed by the radiologists. Facet joints are proven to be the culprit in 15 % - 45 % of patients with low back pain.³

Facet joint injection or facet block can be effectively performed by a radiologist as a pain relief method against facet arthropathy.⁴ Immediate pain relief after the injection identifies or confirms facet joints as the cause of spinal pain. Clinical suspicion of the facet syndrome, and focal tenderness over the facet joints with no significant disc disease are among major indications for facet injections. Except for relative limitations including local area skin conditions limiting injection (puncture site) or allergy to contrast (used for delineation of needle), no absolute contraindications have been documented. Local area skin conditions limiting injection (puncture site) or allergy to contrast (used for delineation of needle). No absolute contraindications have been documented. Similarly, lumbar facet joint injections may be repeated to reinstate pain relief without any deleterious effects.⁵ Image-guided injection of combination of local anaesthetic and steroid into or around the facet joint is meant to break the vicious cycle of inflammation, limited mobility and muscle spasm thereby providing pain relief. Therapeutic outcome is variable, though the procedure itself has shown to have high diagnostic accuracy, safety, and reproducibility.

Although immediate and short-term (3 - 6 months) beneficial effects of facet injections have been documented in literature.⁴⁻⁶ However, very few studies have emphasized upon the long-term therapeutic results of facet injections, and their effectiveness under imaging guidance that can often be combined with epidural injections.⁶ Therefore, we aim to measure repetition rate (i.e., repeated facet joint lumbar intra-articular injection for recurrent complaints) as a measure of effectiveness of either fluoro - or CT - guided procedure for long - term (between 6 - 12 months) therapeutic pain relief at our Hospital.

METHODS

We performed a retrospective study involving secondary data analysis of patients' records in Radiology department at our Hospital in Dhahran between January 2015 to January 2020. All adult patients who had histories of chronic function-limiting low back pains for at least 6 months duration and were diagnosed clinically and radiologically (by either computed tomography or magnetic resonance imaging) with facet arthropathies and mild (Grade - 1) lumbar canal stenoses

(anteroposterior diameter of the canal less than 10 mm, with separation of all cauda equina)^{7,8} were included, and evaluated for image guided (under fluoroscopy or CT) facet injections (with or without epidural injections) and repeat procedures within 6 - 12 month of initial injections.

Patients with acute disc prolapses, previous histories of trauma or injuries to spine, prior lumbar surgeries (discectomies, spino-laminectomies, or spinal fixations), moderate / severe (grade 2 / 3 lumbar stenosis; aggregated and not separated cauda equina) were excluded. Patients with spondylolisthesis (due to pars defects), with systemic inflammatory arthritides (like rheumatoid arthritis, or ankylosing spondylitis), not suitable for the procedures (e.g., those unable to lie in prone position), those with facet tropism (asymmetry between right and left facets, with one joint having more sagittal orientation than the other), and those lost to follow-up were also excluded.

Clinical information was obtained from patients' files / charts using Hospital Information System (HIS) and radiologic data about facet injections were retrieved from Radiology Information System / Picture Archiving and Communication System (RIS / PACS). Research protocol was approved by the Research Committee and need for informed written consents for the study was waived off considering retrospective nature of the study, already consented procedures, and non-disclosure of patients' information. All information was kept strictly confidential. Literature review was performed through electronic search (Google Scholar, PubMed).

All patients who underwent intra-articular facet injections (unilateral or bilateral; single or multiple segments) were grouped as: (i) Facet injections under fluoroscopy (F), and (ii) Facet injections under CT (C) guidance (either alone or combined with epidural injections). Facet injections usually involved 1.5- 2 ml of combination of 40 mg triamcinolone and 0.25-0.5 bupivacaine (for therapeutic purposes), while for epidural injections about 4 - 8 ml of combination of 80 mg triamcinolone and 0.25 - 0.5 % bupivacaine hydrochloride (i.e., 2.5 mg / mL - 5 mg / mL) under fluoroscopy or CT guidance by a single operator (a dedicated musculoskeletal radiologist having more than 10 years of musculoskeletal imaging and intervention experience). All procedures were performed in sterile operating room (Fluoroscopy unit or CT suite) with intermittent scanning (for needle localization), while patients lying in prone positions with intravenous accesses, and light sedation with midazolam offered to all patients. Patients were followed up at 3, 6, and 12 months intervals at neurosurgery clinic (unless otherwise indicated), for need for a repeat procedure for recurrent or unsettling symptoms.

Statistical Analysis

Proportional analysis was performed using Z - test, and p - value less than 0.05 was considered significant.

RESULTS

Out of total 112 patients, 64 were females (57 %) and 48 were males (43 %). Mean age of patients was 56.4 (range 32 - 84 years).

Adequate needle localizations were taken for successful facet [Figure - 1], and when combined with epidural [Figure -

2] injections. One-fifth of patients (23 / 112, 20.5 %) required repeat procedures (either facet injections and / or epidural injections).

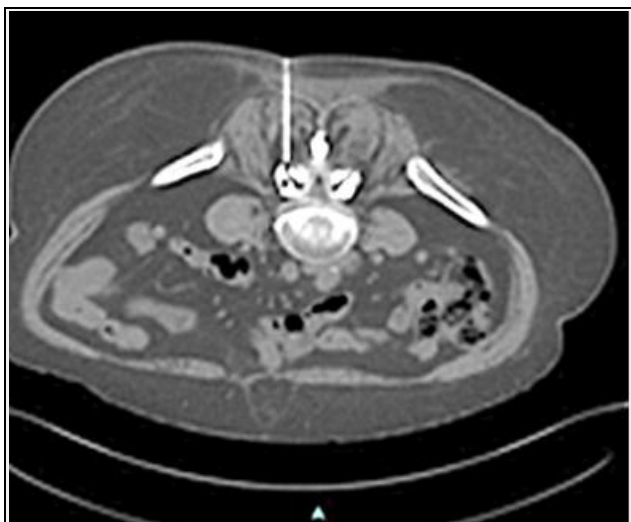


Figure 1. A Selected CT Image of a Patient in Prone Position Showing Needle Alignment and Adequate Position of Its Tip Reaching Left Lumbar Facet Joint



Figure 2. A Selected CT Image of a Patient in Prone Position Showing Needle Alignment and Adequate Position of Its Tip Reaching Right Posterolateral Epidural Space and Contrast Delineation of Space.



Figure 3. A Selective Prone CT Image Showing Bilateral Degenerated Facet Joints in a Patient Prior to Procedure

Twenty out of 78 patients with facet injections under fluoroscopy and 3 out of 34 patients with facet injections

under CT guidance (combined with epidural injections) underwent repeat procedures (p = .01). CT imaging enabled better visualization of degree of degeneration of facet joints [Figure - 3] for better approach and needle adjustment during the procedure. No adverse reactions or complications to these procedures were observed during the study period.

Facet Injections	Repeat Procedure		Total
	Not performed	Performed	
C	31 (91.2 %)	3 (8.8 %)	34 (100 %)
F	58 (74.3 %)	20 (25.7 %)	78 (100 %)
Total	89 (79.4 %)	23 (20.6 %)	112 (100 %)

Table 1. Repeat Procedures after Facet Injections Under Fluoroscopy (F) and CT (C) Guidance
z - value = 2.5468; p-value = 0.01

DISCUSSION

Facet joints are paired synovial joints that form a ‘three - joint complex’ with intervertebral disc. Lumbar facet joints are a common cause of low back pain, facet osteoarthritis being the most frequent form of facet pathologies.⁹ Risk factors for lumbar facet joint arthritis include advancing age, gender (male), (lower) spinal level, facet orientation (sagittal oriented), and associated intervertebral disc degeneration. Lumbar spinal canal or foraminal stenosis may result from degenerative changes in posterior spinal structures (facet arthrosis with or without ligamentum flavum hypertrophy).¹⁰ Interventional radiologist has a key role in facet joint management, in both diagnostics and therapeutics. Our study is a depiction of both roles. Immediate pain relief after facet injections was observed in nearly every patient that revealed facet joints as sources of back pain. Combined facet joint injections with epidural injections seemed to benefit more than isolated facet injections, avoiding more repeat injections. Procedures performed under CT guidance therefore allows the radiologist to adopt better approach and safe manipulation due to its cross-sectional imaging ability and better spatial resolution. E Shim et al found that in lumbar canal stenoses patients, 3 out of 6 patients (50 %) benefitted from an epidural steroid injection (ESI) after an initial failed facet joint injection (FJI), while 13 out of 19 patients (68 %) benefitted from a repeat facet after failed initial ESI.⁶

We used a combination of local anaesthetic and corticosteroid injection for all patients. Although newer injection combination techniques have also been tried and documented. Wu J et al in 2017 did a prospective study involving 46 eligible patients that were randomized into two groups, one had intra-articular injections with platelet-rich plasma (PRP) and the other intra-articular injections with local anaesthetic (LA) and corticosteroid combinations. They found both autologous PRP and LA/corticosteroid injections effective for pain relief, though PRP to be superior treatment option for longer duration efficacy.¹¹ We performed periarticular injections in patients where intra-articular injections were not possible due to moderate osteophytic changes. However, such patients were not categorically isolated to evaluate efficacy of periarticular versus intra-articular injections. Manchikanti L et al found that facet joint interventions increased 1.9 % annually and 18.8 % total from 2009 to 2018 per 100,000 in fee-for-service (FFS) Medicare population.⁴ However, they observed

lumbosacral facet joint nerve block sessions or visits decreased at an annual rate of 0.2 % from 2009 to 2018 and lumbosacral facet joint neurolysis sessions increased at an annual rate of 7.4 % from 2009 to 2018. Researchers have also found that lumbar medial branch radiofrequency ablations (RFAs) may provide benefit to well - selected individuals.^{12,13} with medial branch blocks (MBB) being more predictive than intra-articular (IA) injections. However, they cautioned more stringent selection criteria to improve denervation outcomes, but at the expense of more false negatives.¹⁰ Abd - Elsayed A proposed that one prognostic block can be sufficient to move forward with radiofrequency ablation.¹² Arıcı T and Kılıç E suggested that distal approach with an AP view (distal approach to place the needle parallel to the medial branch) for facet radiofrequency thermocoagulation is a viable alternative to other approaches.¹³

We observed a smaller number of patients for repeat procedures possibly due to adequate interventions. Onafowokan OO et al reviewed strength of evidence available for multiple facet joint injections (FJIs) and medial branch blocks (MBBs) while reporting to NHS England. They found a paucity of levels I and II evidences available for the efficacy of multiple FJIs and MBBs in treating low back pain, with 'Getting it right first time' (GIRFT) data showing a high degree of variation in the use of multiple FJIs.⁵

Grading of facet arthropathy needs to be better assessed by computed tomography [Figure - 3], as MRI may underestimate the grading.² Berg L et al while reviewing follow up imaging of 114 chronic back pain patients found that interobserver agreement on facet arthropathy (FA) severity - based on facet joint space narrowing, osteophyte / hypertrophy, erosions, and subchondral cysts- was better with CT versus MRI.² They observed that agreement was poorer for severity of osteophytes / hypertrophy than for the other evaluated FA findings with CT or MRI thus requiring more consistent grading of osteophytes / hypertrophy between different radiologists. Although we excluded patients with facet tropism. However, it should be noted that facet joint parameters may play an important role in the pathogenesis of recurrent lumbar disc herniation (rLDH). Li Z et al found that facet joint parameters (facet alignment and facet tropism) significantly influence the biomechanics of the corresponding segment.¹⁴ Song Q et al found that most facet joint OA appeared at the segment with intervertebral disc degeneration of more than grade III (sclerosis or moderate osteophytes).⁹ Facet joint OA was significantly exacerbated with the progression of disc degeneration grade.¹⁴ Facet tropism (divergence more than 7° between the facet joint angles of both sides at the same segment) was also found significantly associated with lumbar disc degeneration, though we excluded such patients from our study.

Single center, small sample, single-operator, and retrospective analysis were few of important limitations of our study. Larger scale studies with more selective patients and pertinent lumbar facet parameters need to be addressed to evaluate more specific response and benefit of facet injections with graded approach from injection to ablation.

CONCLUSIONS

CT guided facet injections combined with epidural injections may be more effective in relief of lower back pain in patients with facet arthropathies and mild canal stenoses.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

Financial or other competing interests: None.

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