

What types of degenerative lumbar pathologies respond to nerve root injection? A retrospective review of six hundred and forty one cases

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Abstract

Purpose Peri-radicular injection is a widely used procedure for treating lumbar radicular pain, but it remains unclear what types of lumbar pathologies respond well to this treatment. We aimed to investigate the efficacy of peri-radicular injection for degenerative lumbar disorders and to determine what types of pathologies respond well to this treatment.

Methods We reviewed the records of 641 consecutive patients who underwent peri-radicular injection for degenerative lumbar pathologies with mean follow-up of 23.4 months. The pathologies included herniated disc in 286 patients, spinal stenosis in 141, degenerative spondylolisthesis in 136, failed back surgery in 24, isthmic spondylolisthesis in 22, degenerative scoliosis in 18, and foraminal stenosis in 14. Outcome measure was whether or not surgery is avoided by using peri-radicular injection. The rate of obviating surgery was determined in each pathology.

Results Peri-radicular injection obviated surgeries in 331 patients (51.7 %). There were no complications related to the procedure, including neurological deterioration, infection, and haematoma. The rate of obviating surgery was 42.0 % in disc herniation, 52.9 % in degenerative spondylolisthesis, 67.4 % in spinal stenosis, 54.5 % in isthmic spondylolisthesis, 57.1 % in foraminal stenosis, 61.1 % in degenerative scoliosis and 54.1 % in failed back surgery. Poor outcomes were observed in herniated disc with spinal stenosis (17.9 % success),

foraminal disc herniation (33.3 %), recurrent disc herniation (18.2 %) and failed back surgery with instability (33.3 %).

Conclusions This study demonstrated that 51.7 % of patients with degenerative lumbar pathologies were successfully treated by peri-radicular injection. Efficacy was limited in cases of herniated disc with spinal stenosis, foraminal disc herniation, recurrent disc herniation and failed back surgery with instability.

Keywords Nerve root · Periradicular injection · Nonoperative treatment · Herniated disc · Spinal stenosis · Spondylolisthesis

Introduction

Selective nerve root block, or peri-radicular injection, is a widely used procedure for treating lumbar radicular pain [1–5]. Diagnostic value of this procedure has been reported in an attempt to indicate whether the pain is neural in origin and/or whether the nerve root causes pain in patients with equivocal clinical and imaging studies [6]. Typical pain production and subsequent pain relief in a single symptomatic nerve root was identified with 85 % accuracy through surgical exploration [7].

With respect to its therapeutic value, several studies reported that the use of transforaminal epidural injection serves as a safe and effective nonsurgical intervention for lumbar radicular symptoms [8] and should be applied as a final trial of conservative treatment before deciding upon surgical intervention [2]. Although numerous studies highlight its diagnostic and therapeutic values, it remains unclear what types of lumbar pathologies respond well to peri-radicular injection. Literature addressing the efficacy of this procedure on a pathological basis is sparse.

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The objectives of this study were to investigate the rate of obviating surgery in 641 consecutive patients who underwent selective nerve root injection for a variety of degenerative lumbar disorders and to determine what kind of pathologies respond well to this therapy.

Methods

A total of 641 consecutive patients with degenerative lumbar pathologies were treated by selective nerve root injection. All patients had disability in daily life due to radicular pain and did not respond well to treatment with nonsteroid anti-inflammatory drugs (NSAIDs). There were 335 men and 306 women, with a mean age of 58 (16–93) years. The affected nerve root was diagnosed by neurological findings and magnetic resonance imaging (MRI) or computed tomography (CT).

For diagnostic and therapeutic purposes, we routinely performed selective nerve root injection in operative candidates with radicular pain. Patients were placed prone and oblique on a fluoroscopic table to visualise the contour of the pedicle at the level of injection. Patient position should be adjusted as necessary, as the lateral edge of the pars interarticularis and articular facets do not overlap the area beneath the pedicle. Under local anaesthesia and fluoroscopic guidance, a 23-gauge spinal needle was gently advanced into the neuroforamen by targeting the point beneath the pedicle. Once radiating pain was produced, needle placement was verified with injection of approximately 1 cc of contrast media under fluoroscopic control. After the targeted nerve root was imaged, 1 % lidocaine was injected by 1–2 cc (Fig. 1). Patients

with severe motor weakness due to nerve root compression and/or cauda equine syndrome were excluded from this treatment. Each nerve root was treated by a single injection. The pathologies included herniated disc in 286 patients, spinal stenosis in 141, degenerative spondylolisthesis in 136, failed back surgery in 24, isthmic spondylolisthesis in 22, degenerative scoliosis in 18 and foraminal stenosis in 14. Single-level nerve root injection was performed in 535 patients (83.5 %). One-hundred and six patients underwent multilevel procedures. Patients were reviewed over a mean follow-up of 23.4 months.

We regard nerve root injection as the final procedure in conservative treatment. Therefore, when the nerve root injection failed to reduce pain, patients decided whether or not to undergo surgical treatment based on residual symptoms. As a primary outcome, the rate of obviating surgery was determined in each pathology. Complications associated with the procedure also were investigated.

Results

Selective nerve root injection obviated surgery in 331 patients (51.7 %). There were no complications related to the procedure, including neurological deterioration, infection and haematoma. The rate of obviating surgery (Fig. 2) was 42.0 % in disc herniation (120/286 patients), 52.9 % in degenerative spondylolisthesis (72/136 patients), 67.4 % in spinal stenosis (95/141 patients), 54.1 % in failed back surgery (13/24 patients), 54.5 % in isthmic spondylolisthesis (12/22 patients), 61.1 % in degenerative scoliosis (11/18 patients) and 57.1 % in foraminal stenosis (8/14 patients).

Fig. 1 Procedure of nerve root injection. Patients were placed prone and oblique on a fluoroscopic table. Under local anaesthesia and fluoroscopic guidance, a 23-gauge spinal needle was gently advanced into the neuroforamen by targeting the point beneath the pedicle. Once radiating pain was produced, needle placement was verified with an injection of approximately 1 cc of contrast media under fluoroscopic control. After the targeted nerve root was imaged, 1 % lidocaine was injected by 1–2 cc



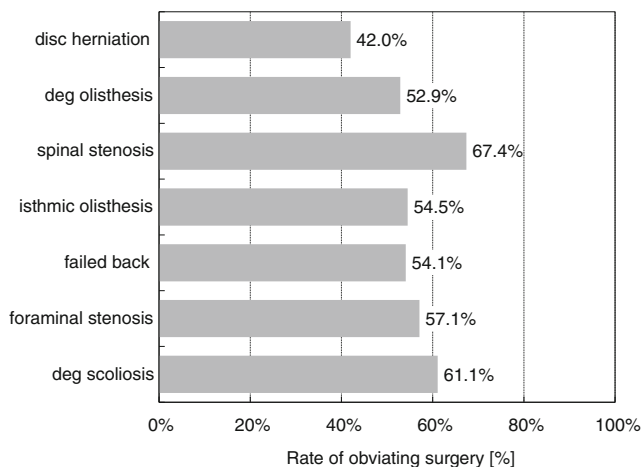


Fig. 2 Rate of obviating surgery in a variety of degenerative lumbar disorders. Nerve root injection had relatively lower efficacy for acute radicular pain due to lumbar disc herniation. Chronic radicular pain associated with spinal stenosis responded well to periradicular injection

Breakdown by type of disc herniation is shown in Fig. 3. The rate of obviating surgery was 47.7 % in simple disc herniation (102/214 patients), 17.9 % in herniated disc combined with spinal stenosis (5/28 patients), 33.3 % in extra- or intraforaminal herniated disc (11/33 patients) and 18.2 % in recurrent disc herniation (2/11 patients). Poor outcomes were

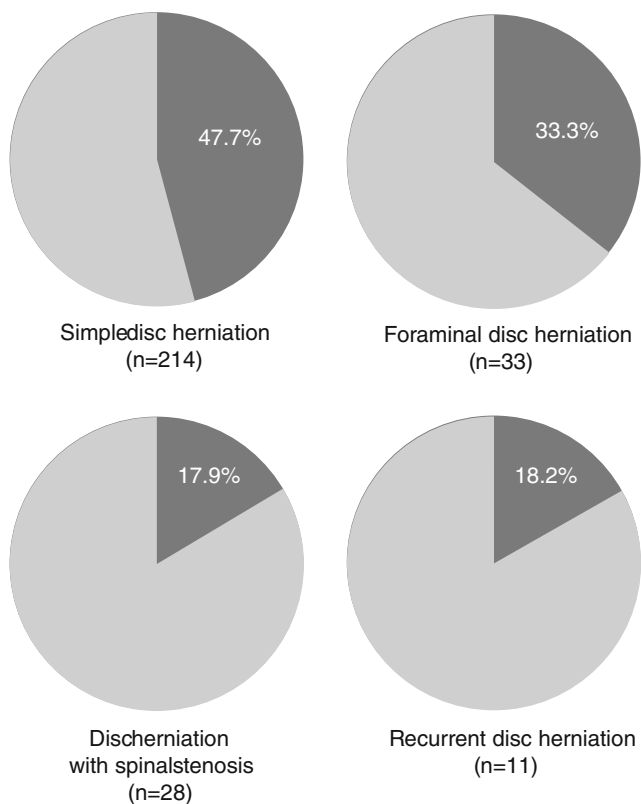


Fig. 3 Rate of obviating surgery in lumbar disc herniation. Poor outcomes were related to herniated disc combined with spinal stenosis, foraminal disc herniation and recurrent disc herniation

observed in patients with combined herniated disc and stenosis or recurrent herniated disc.

Patients with failed back surgery were divided into two groups with respect to presence or absence of spinal instability. Spinal instability was defined as vertebral slip in any directions (antero-, retro-, or laterolisthesis). Ten of 15 patients (66.7 %) who did not develop spinal instability were successfully treated by nerve root injection. The rate of obviating surgery was 33.3 % (3/9 patients) in patients with spinal instability.

Discussion

Lumbar radicular pain associated with degenerative disorders should be primarily treated with nonsteroidal anti-inflammatory medication [9, 10]. However, once the initial treatment fails, many patients seek further intervention, such as epidural or periradicular injection [11–13]. Riew et al. [14] demonstrated, in a prospective, randomised, controlled study, that 25 of 55 operative candidates for lumbar radicular pain were successfully treated by nerve root injection, and the authors advocated that nerve root injection was effective in obviating the need for surgical intervention. As well, the majority of patients who avoid an operation for at least 1 year after receiving a nerve root injection continued to avoid operative intervention for a minimum of five years [14]. Cyteval et al. [3] also prospectively reviewed 229 patients who underwent periradicular injection for lumbar radiculopathy and reported that pain relief (diminution of visual analogue scale (VAS)) was excellent (75 % or more) in 45 patients, good (50–74 %) in 48, fair (25–49 %) in 45 and poor in 91. Although numerous studies highlight the efficacy of nerve root injection, it remains unclear what types of lumbar pathologies respond well to this treatment. Literature addressing the efficacy of this procedure on a pathological basis is sparse.

Our study demonstrated efficacy of nerve root injection for treating degenerative lumbar disorders. Overall, 51.7 % of patients were successfully treated and did not undergo surgical intervention. Chronic radicular pain responded well to treatment; the rate of obviating surgery was 67.4 % in spinal stenosis, 61.1 % in degenerative scoliosis, 57.1 % in foraminal stenosis, 54.5 % in isthmic spondylolisthesis and 52.9 % in degenerative spondylolisthesis. Thus, we recommend employing this procedure routinely before deciding upon surgical intervention, especially for patients with chronic radicular pain if they have no severe motor dysfunction and/or cauda equine syndrome.

Meanwhile, nerve root injection had a relatively lower efficacy for acute radicular pain due to lumbar disc herniation; the rate of obviating surgery was 42.0 %. Analysis based on type of disc herniation demonstrated that the rate of obviating surgery was 17.9 % in a herniated disc combined with spinal

stenosis, 33.3 % in extra- or intraforaminal herniated disc and 18.2 % in recurrent disc herniation. In these pathologies associated with poor outcome, either the narrow space available for the nerve root or perineural scar tissue decreases nerve root mobility and thereby might prevent local anaesthetic agents from effectively spreading to the site of pain origin.

In patients with failed back surgery, the presence or absence of spinal instability affected the response to nerve root injection. Surgical intervention was avoided in 66.7 % of patients without spinal instability but only in 33.3 % of those who had spinal instability. These results show that spinal instability is associated with poor outcome in failed back surgery.

In conclusion, 641 consecutive patients who underwent periradicular injection for degenerative lumbar pathologies were reviewed: 51.7 % were successfully treated, but poor outcomes were observed in those with herniated disc with spinal stenosis (17.9 %), foraminal disc herniation (33.3 %), recurrent disc herniation (18.2 %) and failed back surgery with spinal instability (33.3 %).

One criticism of this study is related to the comparison of different pathologies, especially acute lumbar disc prolapse. Lumbar disc herniation usually causes acute and intolerable sciatic pain, but the majority of patients experienced pain reduction over the natural course of the disorder [15]. Acute disc prolapse might have a better prognosis than bony stenosis [16, 17]. In our study, however, all patients failed pharmaceutical treatment in the acute phase and became candidates for surgery. Patients with lumbar disc herniation, which responds well to initial treatment using pharmaceutical agents, were thereby excluded from the investigation. Although the efficacy of nerve root injection was lower in patients with lumbar disc herniation than in those with bony stenosis, the surgery avoidance rate of 42 % was still encouraging in patients with lumbar disc herniation. Once nerve root injection reduces pain in the acute phase, patients might overcome short-lasting intolerable pain and return to a better natural course.

This is one of the largest retrospective investigations related to nerve root injection and could provide informative data to physicians managing lumbar spine disorders. However, the retrospective nature of the study might be a relative weakness. This study included a variety of lumbar degenerative pathologies, and pain severity at baseline might be different among subgroups, e.g. lumbar disc herniation versus spinal stenosis.

A large, prospective study might be required to verify the conclusions reported here.

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