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Original Article

The value of lumbar dorsal root ganglion blocks in predicting the response to decompressive surgery in patients with diagnostic doubt

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Abstract

BACKGROUND CONTEXT: Pain as a consequence of nerve root compression may not be easy to diagnose. Degenerative changes causing nerve root compression on magnetic resonance imaging (MRI) are common but not necessarily symptomatic while the distribution of pain attributable to a particular nerve root is variable. Selective dorsal root ganglion blocks (DRGBs) have been used in these situations to aid the diagnostic process, although their use remains controversial.

PURPOSE: We sought to investigate the positive predictive value of DRGBs in predicting response to decompressive surgery on a particular nerve root in a patient cohort with diagnostic uncertainty after clinical examination and MRI.

STUDY DESIGN/SETTING: This was a retrospective review of prospectively collected data on 100 consecutive patients.

METHODS: One hundred consecutive patients who underwent diagnostic DRGB under the senior author were identified retrospectively. Clinical records were reviewed for the reason for diagnostic uncertainty, level assessed, whether the DRGB reproduced pain typical for the patient's symptoms, whether there was anatomically appropriate sensory and motor disturbance, whether good pain relief was achieved, and whether they had good response to surgery.

RESULTS: Of 100 patients recruited, four were removed from analysis owing to inadequate surgical decompression proven on postoperative MRI. Of the remaining 96 patients, 74 achieved immediate relief in their symptoms after DRGB. Fifty-one patients underwent surgical decompression after a successful root block; 41 patients achieved a good result from this surgery, and 10 did not. Nine patients who had no relief in their symptoms from DRGB still underwent surgery to decompress the same nerve root; six patients had relief of their symptoms from surgery, two did not respond, and one was lost to follow-up. The most common reason for diagnostic uncertainty was multilevel disease (74%) followed by patients with atypical pain (23%). The most common level assessed was the L5 nerve root. The positive predictive value was found to be 80.4%, the negative predictive value was 22.2%, with a sensitivity of 85.4% and a specificity of 16.7%.

CONCLUSIONS: In patients with diagnostic doubt, a positive DRGB is a good predictor of a positive outcome after surgery to decompress that nerve root. However, the negative predictive value is poor. This result could almost certainly be improved if there was a better definition of what constitutes a positive, and more importantly a negative, DRGB result. In the meantime, DRGBs are a useful adjunct in predicting the outcome of decompressive surgery in people with pain as a consequence of potential lumbosacral nerve root compression.

Keywords: Nerve root block; Sciatica; Diagnostic; Back pain; Surgery; Pain

Introduction

Determining whether pain is as a consequence of compression of a particular nerve root can be difficult. First, there is no agreed definition of the pain which is as a consequence of nerve root compression [1,2], and pain experienced by the patients does not always correspond to typical

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classical dermatomal patterns [3]. Second, degenerative changes causing nerve root compression are common and often multiple on magnetic resonance imaging (MRI) scans but not necessarily painful [4]. At the same time, radiologically equivocal nerve root compression may also cause significant pain and may respond favorably to decompression [5]. Because there is good evidence that pain due to nerve root compression can be effectively treated by surgical decompression [6,7], recognition of pain due to nerve root compression and identification of the nerve root responsible are important. Selective dorsal root ganglion blocks (DRGBs) have been used both therapeutically and to aid diagnosis. Although their utility in temporary pain control in patients with nerve root compression is reasonably clear, their role as a diagnostic test is less so, with controversy over both their rationale and efficacy. A summary of the potential limitations of the technique is discussed by Shah [8].

The diagnostic accuracy of DRGB has been reported to lie between 90% [9,10] and 30% [11]. However, there is no gold standard against which to make comparisons of accuracy. Some have defined DRGB accuracy dependent on anatomic studies [12] or physiological theory [8], on the demonstration of epidural spread of contrast [13], or as compared with myelography or electromyography [9]. In this study, we have examined the utility of a diagnostic DRGB to predict the outcome from decompressive surgery on a particular nerve root where there is true diagnostic doubt despite careful review of the patient's symptom complex, examination, and MRI findings.

This manuscript has been prepared with reference to the STARD (Standards for the Reporting of Diagnostic Accuracy studies) initiative, to improve the accuracy of reporting in studies of diagnostic accuracy. Results were presented, in part, at the British Association of Spinal Surgeons Conference, Norwich, 2013.

Methods

Between 2011 and 2012, a total of 100 consecutive adults, with presumed radicular leg pain, who underwent diagnostic lumbar DRGB by the senior author were identified retrospectively from the senior author's practices. Patients were included if there was significant diagnostic uncertainty from the patient's presenting history, examination and imaging as to whether lumbosacral nerve root compression was indeed responsible. These diagnostic uncertainties included: whether the patient was indeed experiencing pain that was nerve root in origin, whether there was equivocal compression of a suspected nerve root on the imaging, and whether there was multilevel stenosis without a clear single suspect nerve root.

Our study included patients with potentially symptomatic nerve root compression as a consequence of either lateral recess stenosis (including disc protrusion, facet joint hypertrophy, and a combination of both) or foraminal stenosis. No patient was included whose symptoms were attributable to malignant, infective, or traumatic compression. Patients who underwent a purely therapeutic DRGB, in whom the diagnosis was clear, were excluded. The reason for this is that the aim of this study was to investigate the diagnostic utility of DRGB in the patients with truly equivocal symptoms and imaging, rather than those with relative diagnostic certainty that was further supported by findings on imaging.

Clinical records and preinterventional imaging were reviewed. The reason for diagnostic uncertainty, the spinal nerve root level, and the side injected were recorded. The test result was interpreted as positive or negative depending on whether the advancement of the needle and initial injection of anesthetic reproduced pain typical for the patient's symptoms, a clear radiculogram, whether there was anatomically appropriate sensory and motor disturbance immediately after blockade, and most importantly, whether good pain relief was achieved while there was evidence (motor and/or sensory) of a blockade (usually within 5–10 minutes of the injection). Assessment included asking the patient to try and precipitate an exacerbation of their pain by undertaking whatever activity they would normally find particularly painful. The response to surgery was also recorded. The senior author undertook contemporaneous documentation of these variables and was not, therefore, blinded to the immediate outcome of the test.

Various methods of DRG blockade have been described, none without their criticisms. All procedures in this study were undertaken by the senior author with a standardized process. Procedures were performed in a surgical theatre suite under sterile conditions with the patient in the prone position. No patient required intravenous analgesics or anxiolytics. Under uniplanar fluoroscopic guidance, a 12-cm 22-G spinal needle was inserted from a paraspinal entry point and advanced to the superoanterior margin of the intervertebral foramen of the targeted level. When the needle appeared to be in the appropriate place, 2 mL of 1% lidocaine and 0.5 to 1 mL of iopamidol (Niopam 300, Bracco SpA, Milan, Italy) were infiltrated, and correct placement was confirmed with anteroposterior and lateral fluoroscopy, interpreted by the senior author. Once achieved, 1-mL 0.5% bupivacaine hydrochloride and 1-mL (40 mg) triamcinolone acetonide were injected, and the needle was withdrawn. The senior author undertook contemporaneous documentation of whether a positive DRGB was achieved, as described previously. All patients were managed in an identical fashion.

Decompressive surgical technique was dependent on the individual patient pathology but included microdiscectomy, medial facetectomy, and foraminotomy. Instrumented fusion was performed in appropriate cases. All operations were single-level cases. A good outcome was defined as the patient reporting satisfaction with the decrease in their pain and not wishing for any further investigation or intervention. In patients whose symptoms did not resolve within 3 months after surgery, postoperative MRIs were