

ORIGINAL RESEARCH

Cervical nerve root blocks for chronic cervical radiculopathy - Does it influence surgical decision making?

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Abstract

Objective: It is often difficult to pinpoint the affected nerve root/roots from clinical symptoms and Magnetic Resonance Imaging (MRI) alone in patients with chronic cervical radiculopathy and multilevel degenerative changes. MRI often shows degenerative changes at more than one level. Degenerative changes can occur in patients without symptoms and clinical diagnosis. Analyses of referred pain distribution from cervical nerve roots have shown only 50% correlation to the classical sensory dermatome. Surgical treatment of patients with cervical radiculopathy attributed to degenerative disease is associated with moderate outcome results. Our aim was to assess the diagnostic value of cervical selective nerve root blocks (SNRB) in our Trust in surgical decision making.

Methods: The data was collected retrospectively from electronic hospital records on CRIS, PACS and NOTIS on consecutive patients who underwent cervical nerve root blocks for diagnostic purpose between 1st Jan 2011 and 31st December 2011.

Results: Total of 50 patients had cervical SNRB for diagnostic reasons. It influenced surgical decision making in 84% (42) of these patients and not in 2% cases. 10% did not have any follow up after cervical SNRB. Decision in favour of surgery was made in 71.5% of these 42 patients.

Conclusions: In chronic cervical brachialgia, cervical SNRB is extremely influential in surgical decision making, in both whether to operate and which levels scenario.

Key Words: Selective cervical nerve root blocks, Cervical radiculopathy, Magnetic resonance imaging

1 Introduction

Cervical radiculopathy is a leading cause of disability, most frequently causing a combination of pain, weakness and sensory loss.^[1]

An annual incidence of 83.2 per 100,000 population has been reported. Males have approximately a 1.7 times higher incidence than females, with a modal age group between 50 and 54.^[1]

The pathophysiology is one of either lateral disc herniation or spondylosis with exit foraminal stenosis.^[2] Surgical techniques include posterior laminoforaminotomy, Anterior Cervical Discectomy and Fusion (ACDF) or Artificial Disc Replacement (ADR).

The C6 and C7 are most commonly affected nerve roots.^[3] Treatment options include NSAID therapy, therapeutic foraminal steroid injection and surgery. Surgery can sig-

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nificantly reduce or eliminate symptoms, but carries risk of carotid or vertebral artery injury, nerve root damage and spinal cord damage. Surgery is therefore reserved for those patients whose symptoms are otherwise unmanageable.

Only a 50% correlation between presumed nerve root level based dermatosomal pattern of pain on clinical examination and the actual problematic level has been found.^[4]

Magnetic Resonance Imaging (MRI) is used routinely to determine the level/s and severity of disease. The majority of patients with a spondylotic aetiology demonstrate multilevel changes on imaging. In addition, degenerative changes seen on MRI do not always cause symptoms.^[4]

It is therefore not entirely reliable to base determination of problematic nerve root/s on clinical examination and MRI alone.^[4,5]

1.1 Selective nerve root block

In the group of patients for whom surgery is deemed appropriate, accurately isolating the problematic nerve root avoids the risk of targeting the wrong level and the unnecessary additional levels.

Diagnostic information follows from the fact that symptomatic relief or otherwise after selective nerve root blocks (SNRB) indicates whether or not the targeted root is responsible for symptoms. If the root block is unsuccessful, another root may be targeted, until the sought after level is found. SNRB is thus used as a diagnostic aid before surgery until the problematic root/roots are correctly identified.

Small, regional studies have previously described the usefulness of SNRB in predicting the absence of a problematic root in cases of equivocal or multilevel MRI findings, or where discrepancy exists between clinical and MRI findings.^[5,6] SNRB has long been used diagnostically in the lumbar spine.^[6,7] However its use in the cervical spine is relatively untested and the literature remains scant.

1.2 Aim

In our study, we examine whether cervical SNRB alters the decision to perform surgery at a root level thought to be problematic on the basis of clinical examination and MRI. The question of our study is to see how helpful is the cervical SNRB to aid the surgeons in pre-operative decision making about which nerve root level to operate on.

2 Methods

We looked at electronic notes for patients who had undergone fluoroscopically guided cervical SNRB at our Trust between 1/1/11 and 31/12/11. We recorded the presumed problematic root level as determined by clinical examination and MRI. We recorded the level of a cervical SNRB that was subsequently performed and the outcome and complications

of that procedure. Finally, by examining individual surgical clinic letters, we determined whether or not the decision to operate was affected by the outcome of the block.

The presumed problematic nerve root level was determined by a combination of imaging (MRI), clinical and cervical SNRB findings/results. Majority of the patients showed multilevel degenerative changes on pre-procedure MRI scan. After careful clinical examination of the patients in the spinal clinic and identifying a presumed problematic nerve root level, they were referred to the Radiology Department for cervical SNRB to confirm the clinical findings. Final decision regarding whether to perform a SNRB or not and the nerve root level was made by the Radiologist performing the procedure based on imaging findings and more importantly clinical history/examination on the day of the procedure. The SNRB was not performed by the Radiologist, if the signs and symptoms were felt to be non-radicular and it was thought that the patient was unlikely to be benefited from the procedure.

Cervical SNRB technique

Diagnostic fluoroscopically guided cervical SNRB has been used within the regional spinal unit at our centre for a number of years. All the procedures were performed by a single Consultant Radiologist.

The procedure is explained and consent is obtained. Using aseptic technique and under fluoroscopic guidance, a 25 gauge needle is inserted into the neck with anterolateral approach to access the postero-inferior margin of the relevant exit foramen. 0.5 ml of Niopam 200 is injected, and a "rootogram" is confirmed (see Figure 1). 1.5 ml lidocaine (2%) and 1ml dexamethasone (4 mg) are injected. Patients are asked to keep a pain diary until follow up.



Figure 1: Technique of cervical SNRB

The main complication is injection of corticosteroid into the

vertebral artery, which carries the risk of stroke. There were no complications during several cases in our centre.

Only one patient had temporary exacerbation of migraine after injection which seems unrelated to the nerve root injection.

3 Results

During the study period from 1st January 2011 to 31st December 2011, a total of 93 patients were referred to the radiology department for diagnostic cervical nerve root blocks. After careful consideration and correlation of the MRI findings with clinical symptoms, 43 patients were excluded and only 50 were performed as diagnostic injections. The excluded group included: (1) seven patients who had perifacetal injections, (2) two could not be performed due to difficult anatomy, (3) 18 patients had therapeutic effects from cervical SNRB and surgery was not required, and (4) 16 patients were excluded because symptoms/signs were felt to be non-radicular, therefore unlikely to be benefitted from SNRB. See Figure 2 for further breakdown.

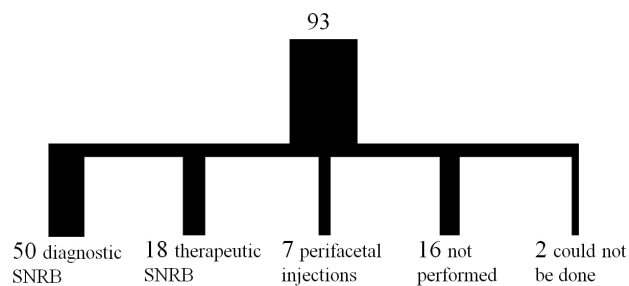


Figure 2: Breakdown of patients referred to the radiology department for diagnostic cervical nerve root blocks

The results were based on 50 patients (27 females and 23 males) who had diagnostic selective cervical nerve root block (see Figure 3). The mean age was 48 years (range 35-73 years) (see Figure 4 for detail).

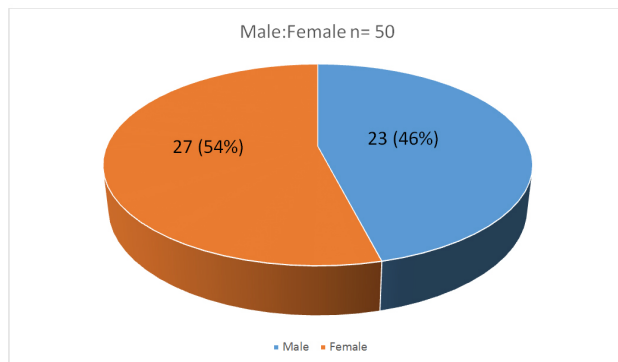


Figure 3: Male:Female ratio

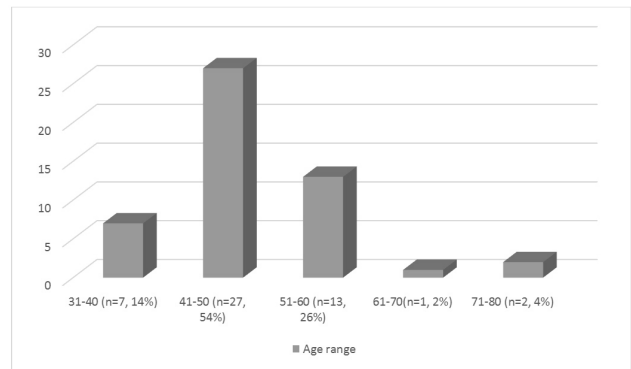


Figure 4: Age range in years

Pre-operative MRI showed single level degenerative changes in 13 patients and two or more levels degenerative changes in 37 patients.

Majority (over 90%) of nerve root blocks were performed at either C6 or C7 level (see Figure 5 for detail).

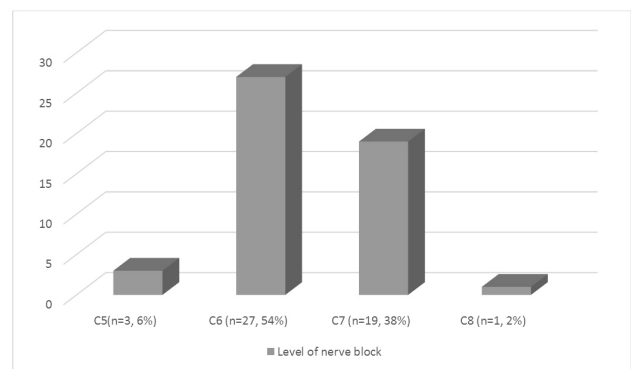


Figure 5: Level of nerve root blocks

All the patient were followed up at least upto 12 months after the procedure.

Selective cervical nerve root block affected decision for surgery in 43 (86%) of patients. 5 (10%) patients were lost in follow up. One patient (2%) is waiting for repeat MRI and follow up and one patient (2%) had problems with thoracic and lumbar pain at the time of follow up. The improvement in pain after the SNRB and subsequent surgery was assessed on the basis of patients' subjective feeling at the time clinic appointment.

Of the 43 patients where decision for surgery was influenced, in 30 (70%) patients the decision was taken in favour of surgery and not in favour of surgery for 13 (30%) patients. Of the 30 patients in whom decision was taken in favour of surgery, surgery has been performed in 15 patients (see Figure 6), four patients (n=4) are on the waiting list to have the surgery awaiting further follow up and 11 patients have deferred the surgery.

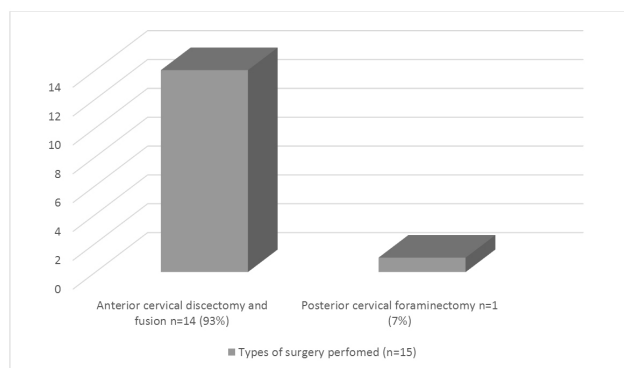


Figure 6: Breakdown of different types of surgeries performed

4 Discussion

Cervical radiculopathy causes debilitating pain and is frequently encountered in spinal practice.^[1] Approximately 1 person in 1,000 suffers from cervical radicular pain.^[4] Cervical radiculopathy is caused by nerve compression from herniated disc material or degenerative bone spurs.^[8] Patients with cervical radiculopathy complain of neck pain and radiating pain in the arm sometimes combined with sensory and motor disturbances in the arm and/or hand.^[9]

Although many improve with conservative treatment, a significant number of patients require surgery. Surgical treatment is still associated with moderate outcome results in patients with degenerative cervical radiculopathy.^[10] In a multicentre study, approximately 26% of patients remained symptomatic after cervical spine surgery.^[11]

Spinal surgery is associated with morbidity and mortality.^[4] Therefore, patients should be selected for surgery only after careful consideration. MRI can give valuable information but in patients with cervical radiculopathy and multi-level degeneration, it is often difficult to define the affected root/roots from clinical examination and MRI only.^[10]

Selective nerve root blocks are useful in the treatment of radicular symptoms, as they allow the infiltration of a corticosteroid around a nerve root and reduce pain.^[12]

The overall prognosis of people with cervical radiculopathy is favourable.^[13]

Selective cervical nerve root blocks can be associated with severe neurological complications.^[14,15] Cerebral infarction is a severe complication due to injection of corticosteroid within the vertebral artery.^[16,17] In the literature, there have been cases of pneumocephalus during cervical transforami-

nal epidural steroid injections.^[18]

Meticulous technique and needle position confirmation with contrast were used. Also, dexamethasone was used, as it is non-particulate and thought to be less likely to cause this complication.^[19] Direct injury of the spinal cord by the needle has been reported during nerve root block in the lateral decubitus position.^[15]

Several approaches have been described for fluoroscopy guided cervical nerve root injections, some of which are lateral approach,^[20] posterolateral approach using two needle technique^[21] and an indirect approach through the ipsilateral facet joint.^[22]

In our study, all the cervical nerve root blocks were performed in anterolateral approach reach postero-inferior margin of the relevant exit foramen. In addition, care was taken to ensure that the tip of the needle was finally located halfway between the medial and lateral border of the lateral mass.

Different technique including Fluoroscopy, CT and US guidance have been in use for cervical nerve root blocks.^[21-24] In our study, all the cases were performed under fluoroscopic guidance.

In our study, we have shown that selective cervical nerve root block is an extremely useful tool to help surgeons in making decision for surgery.

5 Conclusion

Cervical SNRB is a useful diagnostic tool in selecting pain mediating nerve roots. It is also extremely valuable in surgical decision making.

Disclosure

The abstract of this article has previously been accepted and orally presented at the British Association of Spine Surgeons Annual Meeting, Norwich, UK, March 2013.

The first two authors; Dr Paul Emberton and Dr Sandeep Tiwari, have equally participated in the study methodology, analysis and preparation of this manuscript. Therefore, we would like to propose the aforementioned two authors (Paul Emberton and Sandeep Tiwari) for a joint (dual) “first authorship” rank.

Conflicts of Interest Disclosure

The authors declare that they have no conflict of interest.

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