Therapeutic outcomes following CT-guided transforaminal selective nerve root block for cervical radicular pain amenable to surgical decompression: a prospective study

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INTRODUCTION

Cervical radiculopathy has an estimated annual incidence of 83 cases / 100,000 patient-years. It has a significant socio-economic impact, affecting a mostly adult population (average age at diagnosis of 47 ± 13 years)[1]. The majority of patients respond to medical treatment alone, but between 8% to 26% require surgical treatment[2].

The risk of neurovascular injury has initially limited the use of selective nerve root block (SNRB) in the cervical region. However, with the advent of computed-tomography (CT) scan guidance, its safety has been reported to be excellent[3]. The few studies reporting on SNRB have reported significant pain reduction in 24 to 76% of patients[4-6]. However, patient selection was not uniform between these retrospective studies, multiple injections were used in some cases and pain relief had variable duration.

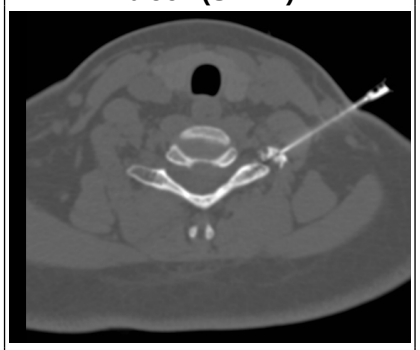
Our main objective was thus to prospectively assess the success rate of SNRB cervical radiculopathy and the duration and sustainability of the pain relief in a population of patients that have previously failed medical treatment and are awaiting surgical decompression.

METHODS

In this observational prospective study, recruitement was done by 3 spine surgeons in the CHUQ - Hôpital de l'Enfant-Jésus, a neurosciences referral center and a regional center of expertise in traumatic and degenerative spinal disorders. Approval from the institutional e thics committee was obtained, and all patients included in the study gave informed consent.

The inclusion criteria was a cervical radiculopathy for 6 weeks or longer, magnetic resonance imaging (MRI) evidence of one level pathology concordant with the clinical diagnosis, age > 18 years old and ability to provide informed consent. Exclusions were moderate to severe cervical myelopathy or progressive deficit, history of previous cervical spine surgery, bilateral or multilevel radiculopathies, allergy to local anaesthetics and uncontrolled medical or psychiatric illness.

Figure 1. Selective nerve root block (SNRB)



Contrast is injected to prevent intradural injection

SNRB Technique (cf. **Figure 1**)

Experienced neuroradiologists did or supervised the SNRB. With the patient supine, 2 mm axial images are obtained to image the cervical root ganglion identified by the surgeon as the target. A 25-gauge spinal needle is introduced through an anterolateral approach, so as to avoid vascular structures. It is then directed toward the articular process in a postero-inferior direction. Following injection of diluted contrast medium and acquisition of images confirming the adequate position, 2 cc of a mixture of lidocaine (1%, without preservative and 10 mg of dexamethasone is injected.

Neck and arm pain were assessed with the visual analog scale (VAS) and function evaluated with the neck disability index (NDI) and the short-form 36 (SF-36) at baseline and at 48 hours, 2, 4 and 8 weeks following the SNRB. The minimum clinically important differences (MCID) and the substantial clinical benefit (SCB), respectively at 7.5 and 9.5 for the NDI, 4.1 and 6.5 for the SF-36 and 2.5 and 3.5 for the VAS were used as reference[7].

RESULTS

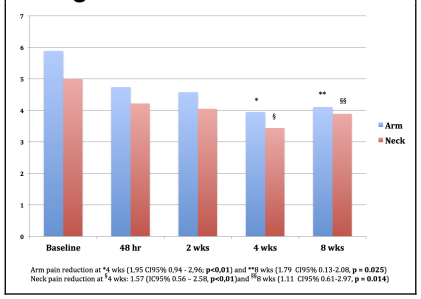
Overall, 21 patients had a SNRB, but 2 patients were lost to follow-up. Mean age was 46 years and average symptom duration was 6.9 months (cf. **Table 1**). There was no complication associated with the SNRB.

Table 1. Patient characteristics

	N (%)
Female	7 (36.8)
Mean age (year ± SD)	46 ± 9.7
Symptom duration (months ± SD)	6.9 ± 5.3
Comorbidities	
Active smoking	3 (15.8)
Dyslipedemia	4 (21.1)
Hypertension	4 (21.1)
Diabetes	3 (15.8)
Obesity	2 (10.5)
Etiology	
Herniated disk	13 (68.4)
Spondylodiscarthrosis	6 (31.6)
Level	
C3-4	1 (5)
C4-5	3 (16)
C5-6	7 (37)
C6-7	8 (42)
C7-T1	1 (5)

Mean maximal arm pain reduction was 2.92 (IC95% 1.86-3.98, P < 0.0001) on the VAS. **Figure 2** shows mean arm and neck pain at baseline and at the different time points assessed. 5 patients (26.3%) had a SCB (> or = 3.5 reduction) in their arm pain at 8 weeks while 7 patients (36.8%) had an

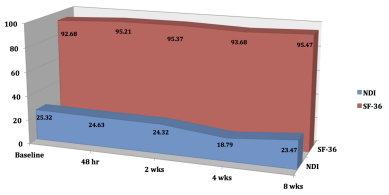
Figure 2. Pain on the VAS



Arm pain reduction at *4 wks (1,95 CI95% 0,94 - 2,96; **p<0,01**) and **8 wks (1,79 CI95% 0,13-2,08, **p = 0,025**)
Neck pain reduction at *4 wks: 1,57 (IC95% 0,56 – 2,58, **p<0,01**)and §8 wks (1,11 CI95% 0,61-2,97, **p = 0,014**)

SCB at any time points during the follow-up period. Using the MCID criteria, 6 patients (31.6%) had a transient decrease in arm pain while 6 (31.6%) presented a durable decrease. In fact, 2 patients (10,5%) achieved adequate pain control and were able to avoid surgery. Moreover, 15 patients (78.9%) reduced their medication intake and 9 (47.4%) reduced their opiate consumption. On the contrary, 2 patients (10,5%) did not report significant change in their arm pain level, 3 (15.8%) had a transient increase and 1 (5.3%) had a sustained increase.

Figure 3. Functional outcome following SNRB



Reduction on the NDI at *4 wks (-6,53, CI95% -0,91 – -12,15; **p<0,05**) and **8 wks (-1,84; CI95% -3,27 – +6,95; p>0,1)
Increase on the SF-36 at *4 wks (+5,83 CI95% -0,88 – +12,54; p>0,05) and §8 wks (+2,79 CI95% -1,36 – +6,95; p>0,1)

On the functional scales, there was a reduction on the NDI at both 4 weeks (-6,53, CI95% -0,91 – -12,15; **p<0,05**) and 8 weeks (-1,84; CI95% -3,27 – +6,95; p>0,1), but this finding was statistically significant only at 4 weeks. Improvements were also noted on the SF-36 at 4 (+5,83 CI95% -0,88 – +12,54; p>0,05) and 8 weeks (+2,79 CI95% -1,36 – +6,95; p>0,1).

DISCUSSION

This study demonstrated the applicability and safety of SNRB in cervical radiculopathy. The arm pain reduction occurred as early as 48 hours after the SNRB. It was however statistically significant only at the 4 and 8 weeks intervals. The reduction was maximal at 4 weeks and, in 6 out of 13 patients (46.2%), the pain improvement was transient. Surprisingly, neck pain presented similar rate and timing of the response to the SNRB when compared to arm pain. Analgesic medication consumption was also reduced. Only minor changes, mostly statistically non -significant, were observed on functional scales. Among the study limitations, only 21 patients were recruited and 2 patients (10.5%) were lost to follow-up. Moreover, there was no control group and follow-up was limited in duration so as not to delay further surgical treatment. Finally, due to the selection criteria, the results of this study may not be generalizable to first line therapy of cervical radiculopathy.

CONCLUSION

SNRB may alleviate arn and neck pain and help reduce analgesic medication intake in compressive cervical radiculopathy amenable to surgery.

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