PS-FP-1-37

Efficacy of Ultrasound-Guided Nerve Root Block for Cervical Spondylotic C6 Radiculopathy

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Purpose: Cervical spondylotic radiculopathy (CSR) is commonly experienced in clinical practice; however, it is often difficult to treat because the pain is usually severe and activities of daily living disability can be serious. Though nerve root blocks (NRB) are sometimes performed using fluoroscopy for intractable root symptoms, complications such as vertebral artery injury are feared. Recently, the widespread of musculoskeletal ultrasound echo has made it possible to safely carry out cervical NRB. The purpose of this study is to examine the effectiveness of ultrasound-guided NRB for CSR.

Methods: We retrospectively reviewed sixteen patients (12 males and four females) who were diagnosed with C6 CSR and underwent ultrasound-guided NRB between April 2018 and July 2019. Xylocaine (0.1%) was used for NRB, and both ultrasound and fluoroscopy were used in all cases. First, we investigated which areas of peri-scapula and upper limb had symptoms: peri-scapula (upper part, body part, intermediate part) and upper limb (upper arm radial side, from the radial side of the forearm to the thumb, from the forearm ulnar side to the little finger, upper ulnar side). Next, the Visual Analog Scale (VAS) scores were evaluated before NRB, immediately after NRB, and 1 month or more after NRB. Finally, the final outcomes (improvement: no need for NRB; no change: continued NRB or not desired; surgery) were examined.

Results: Symptoms appeared in peri-scapula (upper part: 15 cases, inter mediate part: one case) and upper limb (upper arm radial side: 10 cases, from the radial side of the forearm to the thumb: six cases, from the forearm ulnar side to the little finger: one case, upper ulnar side: one case) (including duplication). The VAS scores were 77.5±13.0 mm (range, 50–90 mm) before NRB, 15.0±14.4 mm (range, 0–40 mm) immediately after NRB, and 26.3±17.9 mm (range, 10–70 mm) over 1 month, showing significant improvement compared to before NRB. The final outcomes were improvement (12 patients), no change (two patients), and surgery (two patients). No adverse events were observed with NRB in all patients.

Conclusions: Treatment of CSR is often difficult with medication alone, so surgery is often performed. Although minimally invasive surgery using full-endoscope has recently become available, avoiding surgery is clearly in the patient's best benefit, and ultrasound-guided NRB, which can be performed safely, can be an effective treatment method.

PS-FP-2-1

Spinal Column Phenotypes with Lumbar Developmental Spinal Stenosis:Results from 2,387 Magnetic Resonance Imaging

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Purpose: Lumbar developmental spinal stenosis (DSS) is an imaging phenotype appearing as a shortened antero-posterior (AP) vertebral canal diameter at multiple levels. It is likely a result of maldevelopment of the spinal canal. The relationship of canal narrowing with other radiological parameters in the spinal column is unknown.

Methods: This was a radiological analysis of 2,387 subjects who underwent L1–S1 magnetic resonance imaging (MRI). Means and ranges were calculated for their age, gender, body mass index, and MRI measurements. AP vertebral canal diameters were utilized to differentiate cases of DSS from controls. Other imaging parameters included the vertebral body dimensions, spinal canal dimensions, disc degeneration scores, and facet joint orientation. Mann-Whitney U-test and chi-square test were conducted to search for measurement differences between cases and controls. To identify possible associations between DSS and MRI parameters, parameters that were statistically significant in the univariate binary logistic regression were included in a multivariate stepwise logistic regression after adjusting for subject demographics.

Results: Axial AP vertebral canal diameter, interpedicular distance, AP dural sac diameter, lamina angle, and sagit-

tal mid-vertebral body height were significantly different between cases and controls (all $p<0.05$). Narrower interpedicular distance and AP dural sac diameter were associated with DSS (odds ratio [OR], 0.506–0.745; $p=0.001$–0.002). Lamina angle (OR, 1.127; $p=0.002$) and right facet joint angulation (OR, 0.022; $p=0.002$) were also associated with DSS. No association was observed between disc parameters and DSS.

Conclusions: From this large-scale cohort, the canal size is found to be independent of subject body habitus. Other than spinal canal dimensions, abnormal orientations of lamina angle and facet joint angulation may also be a result of developmental variations, leading to increased likelihood of DSS. Other skeletal parameters are spared. Besides, there is no relationship between DSS and soft tissue changes of the spinal column, which suggested DSS is a unique result of bony maldevelopment. Findings should be validated in other ethnicities and populations.

PS-FP-2-2

Increased Population Risk of Radicular Leg Pain in Lumbar Developmental Spinal Stenosis

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Purpose: Low back pain (LBP) and radiating leg pain are two common health problems around the world. Lumbar developmental spinal stenosis (DSS) may play an important role in pain generation. It is described as pre- existing narrowed vertebral canals at multiple lumbar levels with earlier onset of neurological compromise. Therefore, this study was designed to assess the interaction of DSS and different radiological phenotypes in producing LBP, radiating leg pain and disability.

Methods: This was a population-based study of 2,206 subjects with L1–S1 axial and sagittal magnetic resonance imaging (MRI). Clinical and radiological information regarding subjects' demographics, workload, smoking habit, anteroposterior (AP) vertebral canal diameter, spondylolisthesis, and other MRI phenotypes was assessed. Mann-Whitney U-test and chi-square test were conducted to search for differences between subjects with and without DSS. Associations of LBP and radicular pain in the past month and the past year with the clinical and radiological information were also investigated by utilizing univariate and multivariate logistic regressions.

Results: Of the 2,206 subjects, 153 had DSS. Subjects with DSS had higher prevalence of radicular leg pain, more pain-related disability and lower quality of life (all $p<0.05$). Subjects with DSS had 1.5 (95% confidence interval [CI], 1.0–2.1; $p=0.027$) and 1.8 (95% CI, 1.3–2.6; $p=0.001$) times higher odds of having radicular leg pain in the past month and the past year, respectively. However, DSS was not associated with LBP. Instead, subjects with spondylolisthesis had 1.7 (95% CI, 1.1–2.5; $p=0.011$) and 2.0 (95% CI, 1.2–3.2; $p=0.008$) times more likely to experience LBP in the past month and the past year, respectively.

Conclusions: This large-scale study identified DSS as an independent risk factor of acute and chronic radicular leg pain, and worse disability. DSS is a predictor of radicular pain, and spondylolisthesis is a predictor of LBP. There is an increased likelihood of nerve root compression due to a pre-existing narrowed canal. These subjects are also more likely to have poorer disability and quality of life.

PS-FP-2-3

Effects of Bone Cement Augmentation for Upper Instrumented Vertebra on Adjacent Segment Degeneration in Lumbar Fusions

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Purpose: This study aims to investigate the long-term effects of bone cement-augmented instrumentation in multilevel lumbar fusions. Cement-augmented screw is one of the techniques used to reduce early mechanical failure in multilevel lumbar fusion, especially in the elderly. However, there is little information regarding the long-term effects.

Methods: Fifty patients who underwent more than three levels of lumbar fusion were divided into two groups