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Original Article

Bowel/bladder dysfunction and numbness in the sole of the both feet in lumbar spinal stenosis – A multicenter cross-sectional study

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ABSTRACT

Background: Numbness in the soles of both feet at rest or bowel/bladder dysfunction can occur in patients with lumbar spinal stenosis (LSS), especially in patients with cauda equina lesions. The purpose of this study was to clarify the relationship between cauda equina symptoms at rest and quality of life (QOL) in LSS patients using standardized questionnaires developed for the Japanese population.

Methods: A survey was conducted in 564 hospitals and general practice clinics nationwide from December 1, 2011 to December 31, 2012. All patients who visited hospital or clinic because of low back pain were included. Patients were diagnosed with LSS using the LSS-Diagnostic Support Tool (LSS-DST), and the severity of the disease was measured using the Japanese Orthopaedic Association Back Pain Evaluation Questionnaire (JOABPEQ) for quality of life. Presence of both sole numbness and/or bowel/bladder dysfunction were determined by medical interview. 3647 patients were diagnosed with LSS according to the results of the LSS-DST. 1294 of these patients (35.5%) had symptoms at rest. Of these patients, 359 patients with sole numbness, 135 patients with bowel/bladder dysfunction, and 52 patients with both numbness and bowel/bladder dysfunction were compared to the patients without rest symptoms (n = 2182). Comparisons between groups with or without sole numbness and bowel/bladder dysfunction were performed using statistical analysis of JOABPEQ responses in the categories of pain-related disorder, lumbar spine disorder, gait disturbance, social life disturbance, and psychological disorder.

Results: All groups with sole numbness and/or bowel/bladder dysfunction had statistically lower (worse) scores in all categories of the JOABPEQ compared to the group without these symptoms at rest.

Conclusion: LSS patients having numbness in the soles of both feet at rest or bowel/bladder dysfunction had lower measurements of QOL and activities of daily living than those patients without symptoms at rest. These symptoms appear to be related to QOL of LSS patients.

1. Background

Lumbar spinal stenosis (LSS) presents with lower extremity symptoms [1,2], including neurogenic intermittent claudication as a typical symptom [3]. The patients usually complain of leg pain or numbness during or just after walking or standing. On the other hand, symptoms at rest, such as numbness, sensory disturbance, and bowel/bladder dysfunction, are also seen as symptoms of LSS. As previously reported, functional neuropathies in LSS can be classified into nerve root, cauda equina, and mixed types [4,5]. In the nerve root type, the dominate symptom is lower extremity pain, such as radicular pain or sciatic pain. On the other hand, in cauda equina type, patients show polyradicular symptoms such as saddle hypesthesia with bowel and bladder dysfunction and lower extremity weakness and numbness, especially numbness in the soles of both feet [4]. In particular, the presence of bowel/bladder

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dysfunction indicates severe LSS with cauda equine symptoms, and it should be treated surgically. Therefore, it is important to examine for sole numbness and bladder/bowel dysfunction in the evaluation of LSS patients, paying attention to the possibility of a cauda equina lesion. However, it is unclear how much symptoms at rest, such as numbness of the soles and bowel/bladder dysfunction, affect the quality of life (QOL) of LSS patients.

In this study, the influence of symptoms at rest, such as numbness of the soles or bowel/bladder dysfunction, on the QOL of LSS patients were evaluated.

2. Materials and methods

2.1. Ethics

This study was approved by the ethics committees of the participating institution.

2.2. Study design and population

The survey of the lumbar spinal stenosis diagnosis support tool (DISTO)-project was a multicenter, cross sectional study. The DISTO-project survey was conducted under the guidance of the Japanese Society for Spine Surgery and Related Research. The research group consisted of DISTO-project members. The recruitment period was from December 1, 2011 to December 31, 2012. This survey was conducted in 2177 hospitals and general practices nationwide and included 38,577 participants. The participants were patients who visited the participating institutions and physicians who worked at the participating institutions. The written informed consent for participation was obtained from all participants.

In this study, the patients with low back pain who were aged 20 years or over were enrolled from the DISTO-project survey. The patients with heart failure, renal failure, respiratory failure, hepatic insufficiency, history of spinal surgery, clouding of consciousness, and mental disease were excluded. To diagnose LSS, the diagnostic support tool for LSS (LSS-DST) reported by Konno et al. [6] was used by physicians. The diagnostic factors in the LSS-DST are age, absence of diabetes, intermittent claudication, exacerbation of symptoms when standing up, improvement of symptoms when bending forward, symptoms induced by having patients bend forward, symptoms induced by having patients bend backward, good peripheral arterial circulation, an abnormal Achilles tendon reflex, and a negative SLR test [6]. This clinical diagnostic support tool has a sensitivity of 92.8% and a specificity of 72.0% [6]. Patients were diagnosed with LSS by LSS-DST if they achieved a total score of 7 or more on the LSS-DST.

The Japanese Orthopaedic Association Back Pain Evaluation Questionnaire (JOABPEQ) has been established in Japan as a scale to measure the outcomes of lumbar spinal disorders [7–9]. JOABPEQ is patient-oriented and based mainly on recognizing problems with activities of daily living. It has 25 questions categorized into five factors (pain-related disorder, lumbar spine disorder, gait disturbance, social life disturbance, and psychological disorder.), and each factor is then scored up to 100 points using the measurement scale [9]. The factors are then evaluated separately. The JOABPEQ has been used for evaluating QOL in several lumbar spinal disorders [10]. In this study, the JOABPEQ was used to evaluate QOL and ADL in LSS patients. The presence of numbness of both soles and bowel/bladder dysfunction were defined as symptoms at rest in the present study. If the patients had numbness of the soles, symptoms of urinary disturbance such as feeling of residual urine, frequent urination, dysuria or constipation, these symptoms were noted by the doctors after the medical interview. Each subscale score of the JOABPEQ was compared between patients with or without symptoms at rest to evaluate the impact of the symptoms at rest on the QOL of LSS patients.

A total of 8356 low back pain patients were analyzed in this study. Of the 8356 subjects, 3647 (43.6%) were considered to have LSS according to the results of the LSS-DST. Overall, 1294 of 3647 patients reported symptoms at rest (Table 1). The sole numbness and bowel/bladder dysfunction were examined as the representative cauda equine symptoms at rest. Of these patients, patients with sole numbness (SN group, n = 359), patients with bowel/bladder dysfunction (BD group, n = 135), and patients with both numbness and bowel/bladder dysfunction (SN + BD group, n = 52) were compared to the patients without rest symptoms (Non group, n = 2182).

Statistical analysis was performed using the chi-square test, the Kruskal–Wallis test, and the Wilcoxon rank sum test with Bonferroni correction. A p-value less than 0.05 was considered statistically significant. All statistical analyses were performed by using SAS Ver 9.3 (SAS Institute Inc., Cary, NC, USA).

3. Results

There was no significant difference in sex ratio among 4 groups. There was a significant difference in age between Non group and SN group (Table 2). There were significant differences in each domain of JOABPEQ among the 4 groups ($p < 0.05$) (Table 3). The SN group showed lower scores in every domain compared with the Non group ($p < 0.001$) (Table 3). The BD group showed significantly lower score in pain-related disorder ($p < 0.05$), gait disturbance ($p < 0.001$), and psychological disorders ($p < 0.001$) on the JOABPEQ compared to the Non group (Table 3). The SN + BD group showed significantly lower scores in every domain of the JOABPEQ compared with the Non group ($p < 0.001$) (Table 3). In addition, the SN + BD showed significantly lower scores in lumbar spine disorder ($p < 0.01$) and social life disturbance ($p < 0.05$) compared with the BD group, and in lumbar spine disorder ($p < 0.01$), gait disturbance, and psychological disorder ($p < 0.05$) compared with the SN group (Table 3). These results suggest that the presence of rest symptoms of either sole numbness or bladder/bowel dysfunction was related to a lower JOABPEQ score in LSS patients. The co-existence of these symptoms was related to a much worse score on the JOABPEQ.

4. Discussion

In this study, numbness in the soles of both feet and bowel/bladder dysfunction were defined as rest symptoms. When the LSS

Table 1
Demographic data.

N	Total	LSS (−)	LSS (+)
	8356	4709	3647
Age			
20–29	489	478	11
30–39	868	822	46
40–49	887	794	93
50–59	1073	779	294
60–69	2192	1092	1100
Over 70	2847	744	2103
Sex			
Male	4310	2412	1898
Female	4028	2284	1744
Symptoms at rest (−)	6056	3874	2182
(+)	1831	537	1294
Numbness of the both sole *at rest*		103	359
Bowel/bladder dysfunction		37	135
Both symptoms		2	52

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