

Spinal sagittal balance status affects postoperative actual falls and quality of life after decompression and fusion in-situ surgery in patients with lumbar spinal stenosis[☆]

Byung Ho Lee^a, Jin-Oh Park^b, Hak-Sun Kim^b, Kyung-Soo Suk^b, Sang-Yoon Lee^b, Hwan-Mo Lee^b, Jae-Ho Yang^b, Seong-Hwan Moon^{b,*}

^a Department of Orthopedic Surgery, Catholic-Kwandong University College of Medicine, Incheon, Republic of Korea

^b Department of Orthopedic Surgery, Yonsei University College of Medicine, Seoul, Republic of Korea

ARTICLE INFO

Article history:

Received 2 May 2016

Received in revised form 20 June 2016

Accepted 20 June 2016

Available online 21 June 2016

Keywords:

Lumbar
Spinal stenosis
Surgery
Risk of falling
Sagittal balance

ABSTRACT

Objectives: It has been reported that good spinal sagittal alignment reduces the risk of fall and positive sagittal balance is the radiographic parameter that is most highly correlated with adverse health outcomes. However, no reports have demonstrated a change in risk of falling in patients with lumbar spinal stenosis (LSS) according to sagittal balance status.

Patients and methods: From September 2013 to October 2014, 141 patients who underwent lumbar spine surgery, including decompression and fusion in-situ for LSS, were enrolled in this study. Based on sagittal balance status, patients were divided into sagittal balance (SB) and sagittal imbalance (SI) groups. Four functional mobility tests were used to evaluate the risk of falling, and a fall diary, Oswestry disability index (ODI), and the Euro-QoL 5D(EQ-5D) visual analogue scale (VAS) were utilized to assess clinical improvement.

Results: The mean patient age was 70.1 years in the SB group (N = 46) and 70.9 years in the SI group (N = 95) (not significant). The mean C7PL was 7.9 mm in the SB group and 66.1 mm in the SI group preoperatively ($p < 0.05$). Among the four functional tests, only postoperative SMT and STS improved significantly in the SB group ($p < 0.05$). Patients in the SI group showed significantly improved scores for all four functional tests during postoperative follow-up ($p < 0.05$), but their performance was still worse than patients in the SB group. Average number of falls per individual during the follow-up period was 1.1 ± 2.5 in the SB group and 1.9 ± 3.2 in the SI group ($p < 0.05$). There was a significant difference in the distribution of non-fallers and fallers (single and multiple fallers) between the two groups postoperatively ($p < 0.05$). ODI and the EQ-5D VAS showed greater improvement in the SB group than the SI group. Multiple regression analysis revealed that sagittal balance during follow-up significantly affected ODI, EQ-VAS, functional mobility tests. ($p < 0.05$).

Conclusion: Therefore, when fusion surgery is planned in patients with LSS, careful consideration of sagittal balance status might be important to attain better surgical and functional outcomes and decrease the incidence of actual falls after surgical treatment.

© 2016 Elsevier B.V. All rights reserved.

Abbreviations: LSS, lumbar spinal stenosis C7PL C7 plumb line; SMT, six-meter-walk test; STS, sit-to-stand test; SBgroup, sagittal balance group; SIgroup, sagittal imbalance group.

[☆] Level of evidence: therapeutic- level III-retrospective analysis of prospectively collected data.

* Corresponding author at: Department of Orthopedic Surgery, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-752, Republic of Korea. E-mail address: shmoon@yuhs.ac (S.-H. Moon).

<http://dx.doi.org/10.1016/j.clineuro.2016.06.016>

0303-8467/© 2016 Elsevier B.V. All rights reserved.

1. Introduction

Patients with lumbar spinal stenosis (LSS) have an increased risk of falling. Decompressive surgery for LSS has been shown to decrease the risk of falling in LSS patients compared to the non-operative group by improving physical performance, including walking and balancing [1,2]. It has also been reported that good spinal sagittal alignment reduces the risk of falling [3] and that positive sagittal balance is the radiographic parameter most highly correlated with adverse health outcomes [4].

However, no previous studies have demonstrated a change in the risk of falling in patients with LSS according to sagittal balance

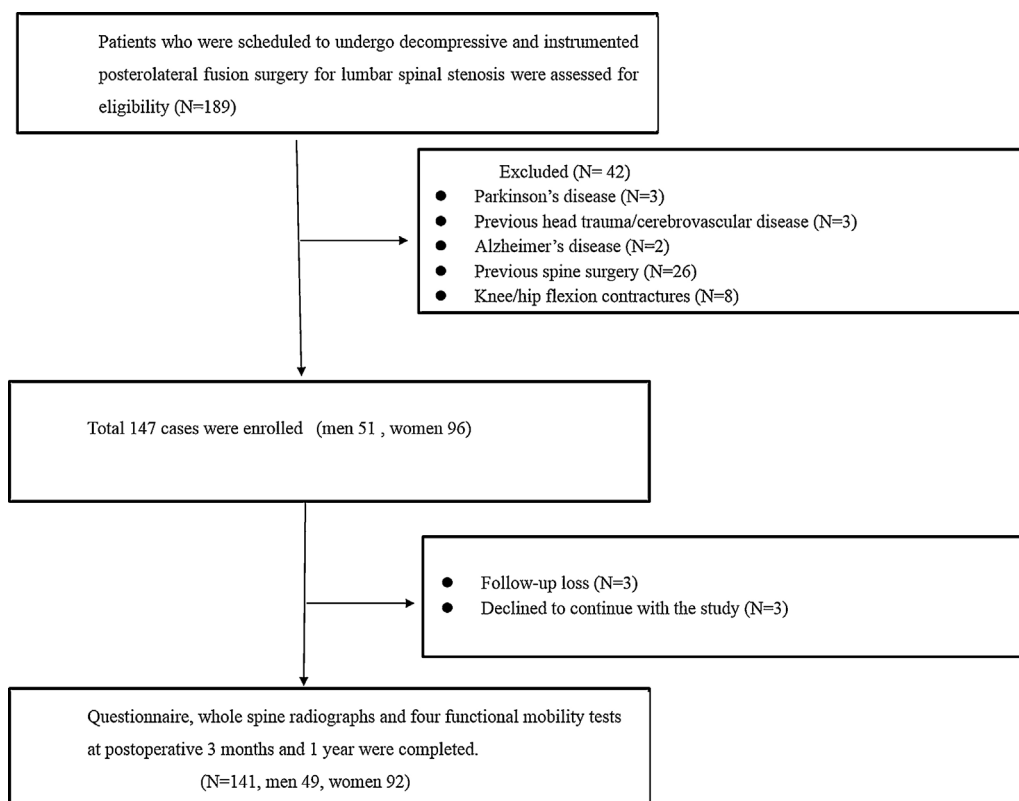


Fig. 1. Enrollment and follow-up of the study participants.

status. We hypothesized that whole spinal sagittal balance status in patients with symptomatic LSS might affect surgical outcomes in terms of functional mobility tests reflecting the risk of falling, as well as quality of life. Therefore, our objectives in the current investigation were to assess if there was a change in the risk of falling and quality of life in patients with LSS after decompression and fusion in-situ surgery based on whole spinal sagittal balance status.

2. Materials and methods

This study was approved by the Institutional Review Board of the authors' hospital. From September 2013 to October 2014, 147 patients (51 men, 96 women) of 189 patients who underwent lumbar spine surgery, including decompression and fusion in-situ procedure(s) for LSS, agreed to enroll in the present study and were included prospectively (Fig. 1). Collected data were analyzed retrospectively. All patients were treated conservatively first with daily oral medication including celecoxib and limaprost/pregabalin. Additional pain blocks were also recommended as needed. Patients with symptomatic LSS, defined as the occurrence of neurogenic claudication within 10 min after initiation of walking and without improvement after conservative treatment, were recommended to undergo surgery. Patients with the same clinical symptoms, but who refused surgical treatment, were excluded from the study group. Patients with other conditions that hampered their functional performance test results, such as Parkinson's disease, previous history of spine surgery, head trauma, current/old cerebrovascular events (cerebral hemorrhage and cerebral infarct), and other neurodegenerative conditions that could potentially affect functional mobility tests including Alzheimer's disease or a specific ataxic condition, were also excluded [5–8]. Furthermore, based on the whole length of lower extremities X-rays, patients with severe osteoarthropathic conditions that caused knee and hip joint

contracture that affected whole spinal sagittal balance were also excluded from the patient pool [9]. Among the patients that met the inclusion criteria, six were lost to follow-up after 3 months or 1 year postoperatively.

In total, 141 patients (49 men, 92 women) in the surgery group were followed-up for at least 1 year postoperatively.

Major diagnoses were spinal stenosis (104 patients) and spinal stenosis with spondylolisthesis (37 patients). All patients were treated with decompression and instrumented posterolateral fusion in-situ using local autologous and allo-chip bone grafts. Fifty-one (36.2%) patients underwent one level surgery, 70 (49.6%) patients underwent two level surgery, 16 patients (11.3%) underwent three level surgery, two patients (1.4%) underwent four level surgery, and two patients (1.4%) underwent five level surgery.

Walking distance in a single trial, the Oswestry Disability Index (ODI), the Euro-QoL 5D(EQ-5D) and Euro-QoL-visual analogue scale (VAS) were recorded during the initial preoperative evaluation [10,11]. These parameters were similarly evaluated at 3 months and 1 year postoperatively.

Standard, full-length, 36-inch lateral radiograph of the spine was used to evaluate the whole spinal sagittal balance. The C7 plumb line(C7PL) was placed over the center of the vertebral body and its distance from the postero-superior corner of the S1 measured. An offset >2.5 cm anteriorly or posteriorly is considered to indicate sagittal imbalance [12], and patients were assigned to the sagittal balance (SB) or sagittal imbalance (SI) groups based on their preoperative whole spine lateral radiographs. Different components such as thoracic kyphosis (TK) and lumbar lordosis (LL) [13] were recorded, and pelvic incidence (PI), pelvic tilt (PT), and sacral slope (SS) angles were used to describe the shape and orientation of the pelvis [14]. The absence of continuity in the fusion mass between the transverse process on one or both sides, greater than 2° of angular motion, or any translation were considered fail-

Download English Version:

<https://daneshyari.com/en/article/3039521>

Download Persian Version:

<https://daneshyari.com/article/3039521>

[Daneshyari.com](https://daneshyari.com)