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Surgical Results of Non-fusion Stabilization with SSCS System for Degenerative Lumbar Spinal Diseases with Instability - Minimum 2 Year Follow-up
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Introduction: In case of spinal fusion, adjacent segment disorder will be a headache in the future. On the other hand, decompression alone procedure could cause revision surgery for recurrent spinal canal stenosis in many cases due to increased instability on operated segments. The surgical results of SSCS system for unstable degenerative lumbar disease with more than 2 years follow-up are presented.

Materials and methods: 52 patients (35 males and 17 females) aged between 21 and 82 (mean age 64.3). The follow-up period was from 24 months to 46 months (mean follow-up period 35.4 months). 20 patients with degenerative spondylolisthesis, 10 patients with lumbar spinal canal stenosis, 6 patients with disc herniation, 15 patients with lumbar canal stenosis with disc herniation and 1 patient with lumbar discopathy. Instability was observed by X-ray in all cases. We defined as instability if either of the following was observed:
1) More than 5º of posterior angulation.
2) More than 3 mm of anterolisthesis.
3) Sagittalization of facets.

One-level stabilization was applied to 50 patients, two-level to 1 patient and three-level to 1 patient. We utilized the Japanese Orthopedic Association (JOA) score to evaluate the clinical results. And also, Cobb angle (max. flexion and extension of Pre-OP and the final follow-up), ROM (Pre-Op and the final follow-up), occurrence of adjacent segment diseases and instrument failure were evaluated.

Results: The Pre-OP JOA score was 14.4±5.3 and it was improved to 25.5±2.8 postoperatively. The Pre-OP Cobb angle was -2.8°±4.8°(maximum flexion) and 6.8°±4.8°(maximum extension). The Pre-OP ROM was 9.6°±4.2°. The Post-OP Cobb angle was 3.2°±3.7°(maximum flexion) and 5.1°±3.9°(maximum extension). The Post-OP ROM was 2.0°±1.8°. The posterior angulation observed preoperatively but it disappeared. The ROM decreased significantly. Adjacent segment disorder appeared in 3 patients. Two patients are followed closely with conservative treatment since the symptom was mild, discectomy and PLF was performed in 1 patient. There was 1 screw breakage and 1 screw loosening at S1 but both cases were asymptomatic.

Discussion: The biggest drawback of the conventional spinal fusion is future adjacent segment disorders. 36.1% of revision surgery rate in minimum 10-year follow-up was reported. Graf system was reported that the percentage of the adjacent segment disorders occurrence was 7% in minimum 10-year follow-up. Thus non-fusion stabilization is expected to give less influence to adjacent segments. The SSCS system was developed by Prof. Archibald H. von Strempel in 1989. The SSCS system is a very unique system with the solid rod and the pedicle screw that has mobility in its screw head. Breakage of hinge is concerned due to its structure but there has been no report of breakage. Since longer-term (more than five years) follow-up has not been reported yet, the result of adjacent segment disorders is unknown. However, there was only one screw breakage and only one revision surgery due to the adjacent segment disorders in our experience from 2 years to 4 years.

Conclusion: The result of over minimum 2-year follow-up of the non-fusion stabilization (SSCS system) for unstable degenerative lumbar disease was good. It is necessary to follow-up the cases with focus on adjacent segments disorders in the future.