

Fusion in Isthmic Spondylolisthesis compared to degenerative indications

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Aim of the study

Retrospektive evaluation of the specialities in fusion of isthmic spondylolisthesis (IS) compared to those in degenerative diseases (DD) of lumbar spine.

Patients and method

We looked at the data of 73 patients being operated because of IS between 9/06 and 10/13, comparing fusions of 81 patients in DD of L5/S1 of the same time period, concerning age at operation, sex, segment and grade of spondylolisthesis, indication, technique, duration of operation, early complications and importance of neuromonitoring.

Results

Within the same time fusions because of IS were 12% of all lumbar spine fusions.

SI: compared to the other single-level-L5/S1 fusions within the same time period IS was indication in 35%.

60% were female patients. Average age was 48(25-84) years, age distribution demonstrated three culminations (26% 30-39y, 29% 40-49y and 20% 60-69y). 86% concerned L5, 10% L4, each 1%, L2 or L3 and in combination L4 und L5.

67% showed grade 1, 22% grade 2 and 11% grade 3 slippage. Only in 22% severe low back-pain was the indication, in the vast majority radicular pain played the most important role; in 13% paresis was evident, in 1% cauda lesion.

All IS-cases were treated by intercorporeal fusion (PLIF or AxiaLIF), PLIF-procedure with in-toto-exstirpation of the mobile lamina of the olisthetic vertebra; 70% were operated monosegmentally, 25 % including the cranial segment, partially with dynamic instrumentation.

Our results demonstrate an average op-duration of 115 (65-210) min for single-level-PLIF and 40 (20-65) min for stand-alone AxiaLIF L5/S1.

15 patients were treated by stand-alone AxiaLIF; of those, 2 screws had to be removed within 6 weeks because of posterior subluxation, in 1 case AxiaLIF could not be implanted because of anterior position of L5 (20%).

The rate of early revisions in IS after PLIF was 10%.

In 21% (6/28 cases) using neurominotoring this was important: in three cases the screw-placement was changed, in two cases 2 the drill canal in the pedicle was changed. In 1 case reduction of a grade 3 spondylolisthesis was only possible without severe changes in EMG of L5-muscles after maximal distraction.

DD: 81 patients with L5/S1-single-level fusion, sex relation 60% female, av. age 65,5y (34-86y). Indications were:

44% osteochondrosis, mostly Modic-I-type, 20% failed back, 16% degenerative slippage L5, 11% adjacent disc disease after fusion, 7% pseudarthrosis, 2% Anderson-lesion in Bechterews-disease.

Degenerative L5/S1 changes were treated by PLIF, TLIF or AxiaLIF; average op-time in PLIF or TLIF (38 patients) 102 min (60-180min); revision-rate of PLIF or TLIF within 6 weeks was 6%. OP-time in AxiaLIF (43 patients) 36 min (20-75min). Early revision rate in AxiaLIF was 14% (3 revision of hematomas, 2 because of bowel lesion, 1 because of radicular pain L5).

Conclusion

IS of L5/S1 caused 35% of single-level L5/S1 fusions, followed by 29% in osteochondrosis, 13% failed back, 10% degenerative spondylolisthesis, 7% adjacent disc disease after fusion above, 5% pseudarthrosis and 1% Andersson-lesion in Bechterews disease. Age at operation is significantly lower IS-operation.

Operation in IS in most cases is necessary because of severe radicular pain without improvement to conservative treatment due to foraminal stenosis by disc narrowing and bulging, with radicular motoric weakness in 10%. Central spinal stenosis is extremely rare, but can occur in dysplastic-high grade olisthesis by kinking of the dural sac above the posterior edge of S1 with symptoms of conus/cauda-lesion.

In both groups 60% female patients are concerned. Two thirds of slippage are grade 1, but all together 11% grade 3, which are rather difficult in operation technique.

Nearly 90% of IS concern L5, 10% L4; L2 and L3 are possible, but very rare.

Operation can be technically demanding because of anatomic changes (narrow and deep pedicles, spina bifida, high-grade slippage) and is generally more difficult than in degenerative spondylolisthesis; op-time is significantly longer (115 vs 102 min) in PLIF or TLIF-single-level-fusion L5/S1 because of IS than of DD, and short-time-revision rate is also higher in both PLIF/TLIF (10% vs 6 %) and AxiaLIF (20% vs 14%).

In spite of much shorter operation time AxiaLIF cannot be recommended at the moment because of danger of bowel perforation (all together 3,5%) as a very severe complication and especially in spondylolisthesis because of difficult technique with danger of posterior sublaxation and failure of decompressing the L5-root.

Especially in high-grade olisthesis neuromonitoring can be very important to avoid complications, both looking for a correct screw position and performing reduction without root-lesion.