The Clinical and Radiographic Degenerative Spondylolisthesis Classification and Its Predictive Value

Henrik Constatin Backer[1], Peter Turner, Michael A Johnson, John Edward Cunningham[2]
[1]Royal Melbourne Hospital, [2]Mr John Cunningham

INTRODUCTION: A new classification has been introduced for degenerative spondylolisthesis (DS) with four subtypes. Type A: advanced disc space collapse without kyphosis; Type B: disc partially preserved with translation of 5 mm or less; Type C: disc partially preserved with translation of more than 5 mm; and Type D: kyphotic alignment.

This study aimed to analyze the long-term functional and radiographic outcome following degenerative spondylolisthesis surgery.

METHODS: A retrospective trial of our prospective database was performed using the Australian spine registry. Data on demographics, preoperative, 6 months, 12 months, and 24 months postoperative patient-reported outcome measures (PROMs) applying the Oswestry Disability Index (ODI), EQ-5D-3L scores were collected. All pre- and postoperative EOS scans were analyzed and measurements of the L4/5, and L1/L5 lordosis, pelvic incidence, pelvic tilt, sacral slope, coronal list, and degree of spondylolisthesis (slip) were measured. In addition the type of fusion (PLIF vs. TLIF) was noted. Based on the preoperative findings all x-rays were classified applying the CARDS classification as described above.

RESULTS:

Between 2018 and 2021 a total of 62 patients at a mean age of 67.8±11.6 years were included. A majority of patients were female (60.3%). Preoperatively, the L4/5 lordosis was 19.6±8.6°, lumbar lordosis was 42.9±11.8°, pelvic incidence was 59.2±9.4°, pelvic tilt was 22.6±6.4°, and sacral slope was 35.7±7.6°. The preoperative slip was 4.6±3.2mm and a coronal list of -22.5±50.2mm was found. There were 38.9% of CARDS type B and C and 11% of type A and D were observed in 11.1%. Postoperatively, L4/5 lordosis changed significantly to 26.3±9.6° (p=0.024). No changes in pelvic incidence, tilt, sacral slope, and coronal list were observed.

The preoperative ODI was 41.9±12.2 which changed significantly to 21.2±15.2 at 24 months and EQ-5D-3L scores 57.4±20.9 changed significantly to 76.8±24.0 at 24 months. The CARDS classification ODI for Type A was was 44±8.5 changing to 17±9.9 at 24 months; Type B 43.3±6.5 to 26.4±20.1; Type C 39.7±18.6 to 23±21.2; Type D 44±14.1 to 10.0±5.7. Similar improvements were observed for the EQ-5D-3L which were Type A 77.5±3.5 to 89.5±0.7; Type B 51.4±21.0 to 67.0±22.2; Type C 61.7±19.3 to 54.5±62.9; Type D 60.0±14.1 to 82.5±4.9.

DISCUSSION AND CONCLUSION: This study shows that the CARDS classification predicts the improvement in functional outcome and change in lumbar lordosis well. It will help to simplify the diagnosis and surgical planning, especially for A and D types who benefit more from single level fusion.