Cage subsidence

Progression of settling with endplate collapse is defined as subsidence.

Subsidence irrespective of the measurement technique or definition does not appear to have an impact on successful fusion and/or clinical outcomes. A validated definition and standard measurement technique for subsidence is needed to determine the actual incidence of subsidence and its impact on radiographic and clinical outcomes ¹).

PEEK cages showed a high rate of secondary subsidence (32%) ²).

Titanium Wing cage-augmented ACDF was associated with comparatively good long-term results. Subsidence was present but did not cause clinical complications. Furthermore, radiological studies demonstrated that the physiological alignment of the cervical spine was preserved and a solid bone arthrodesis was present at 2 years after surgery ³).

Case series

Few studies have reported direct comparative data of lumbar spine angles between direct lateral interbody fusion (DLIF) and oblique lateral interbody fusion (OLIF). The purpose of the study of Ko et al., was to investigate the clinical and radiological outcomes of DLIF and OLIF, and determine influential factors.

The same surgeon performed DLIF from May 2011 to August 2014 (n=201) and OLIF from September 2014 to September 2016 (n=142). Radiological parameters, cage height, cage angle (CA), cage width (CW), and cage location were assessed. They checked the cage location as the distance (mm) from the anterior margin of the disc space to the anterior metallic indicator of the cage in lateral images.

There were significant differences in intervertebral foramen height (FH; 22.0±2.4 vs. 21.0±2.1 mm, p<0.001) and sagittal disc angle (SDA; 8.7±3.3 vs. 11.3±3.2°, p<0.001) between the DLIF and OLIF groups at 7 days postoperatively. CA (9.6±3.0 vs. 8.1±2.9°, p<0.001) and CW (21.2±1.6 vs. 19.2±1.9 mm, p<0.001) were significantly larger in the OLIF group compared to the DLIF group. The cage location of the OLIF group was significantly more anterior than the DLIF group (6.7±3.0 vs. 9.1±3.6 mm, p<0.001). Cage subsidence at 1 year postoperatively was significantly worse in the DLIF group (6.7±3.0 vs. 9.1±3.6 mm, p<0.001). Cage location was significantly correlated with postoperative FH (β=0.273, p<0.001) and postoperative SDA (β=−0.358, p<0.001). CA was significantly correlated with postoperative FH (β=−0.139, p=0.044) and postoperative SDA (β=0.236, p=0.001). Cage location (β=0.293, p<0.001) and CW (β=−0.225, p<0.001) were significantly correlated with cage subsidence.

The cage location, CA, and CW seem to be important factors which result in the different-radiological outcomes between DLIF and OLIF ⁴).

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Mende et al. performed a retrospective analysis of ACDF patients from 2004 to 2010. Numeric analog scale (NAS) score pre-op and post-op, Oswestry Disability Index (ODI) on x-rays, endplate (EP) and cage dimensions, implant position, lordotic/kyphotic subsidence patterns (>5°), and cervical alignment were recorded. Subsidence was defined as height loss >40%. Patients were grouped into single segment (SS), double segment (DS), and plated procedures. We included 214 patients. Prevalence of subsidence was 44.9% overall, 40.9% for SS, and 54.8% for DS. Subsidence presented
mostly for dorsal (40.7%) and mid-endplate position (46.3%, p < 0.01); dorsal placement resulted in kyphotic (73.7%) and central placement in balanced implant migration (53.3%, p < 0.01). Larger cages (>65% EP) showed less subsidence (64.6 vs. 35.4%, p < 0.01). There was no impact of subsidence on ODI or alignment. NAS was better for subsided implants in SS (p = 0.06). Cages should be placed at the anterior endplate rim in order to reduce the risk of subsidence. Spacers should be adequately sized for the respective segment measuring at least 65% of the segment dimensions. The cage frame should not rest on the vulnerable central endplate. For multilevel surgery, ventral plating may be beneficial regarding construct stability. The reduction of micro-instability or over-distraction may explain lower NAS for subsided implants.


