# Cervical PEEK cage case series

## 2021

Lee et al. from Yangsan retrospectively reviewed the medical records of 40 patients who underwent stand-alone single-level ACDF using a polyetheretherketone (PEEK) cage between January 2012 and December 2018. The study population comprised 19 male and 21 female patients aged 24-70 years. The minimum follow-up period was 1 year. Twenty-seven patients had preoperative bone mineral density (BMD) data on dual-energy X-ray absorptiometry. Clinical parameters included sex, age, body mass index, smoking history, and prior medical history. Radiologic parameters included the C2-7 cobb angle, segmental angle, sagittal vertical axis, disc height, and total intervertebral height (TIH) at the preoperative and postoperative periods. Cage decrement was defined as the reduction in TIH at the 6-month follow-up compared to preoperative TIH. To evaluate the bone quality,Hounsfield unit (HU) value was calculated in the axial and sagittal images of conventional computed tomography.

Lumbar BMD values and cervical HU values were significantly correlated ($r=0.733$, $p<0.001$). They divided the patients into two groups based on cage decrement, and 47.5% of the total patients were regarded as cage decrement. There were statistically significant differences in the parameters of measuring the HU value of the vertebra and intraoperative distraction between the two groups. Using these identified factors, we performed a receiver operating characteristic (ROC) curve analysis. Based on the ROC curve, the cut-off point was 530 at the HU value of the upper cortical and cancellous vertebrae ($p=0.014$; area under the curve [AUC], 0.727; sensitivity, 94.7%; specificity, 42.9%) and 22.41 at intraoperative distraction ($p=0.017$; AUC, 0.722; sensitivity, 85.7%; specificity, 57.9%). Using this value, they converted these parameters into a bifurcated variable and assessed the multinomial regression analysis to evaluate the risk factors for cage decrement in ACDF. Intraoperative distraction and HU value of the upper vertebral body were independent factors of postoperative subsidence.

Insufficient intraoperative distraction and low HU value showed a strong relationship with postoperative intervertebral height reduction following single stand-alone PEEK cage ACDF [1)].

## 2018

The aim of the study was to compare the outcome of anterior cervical decompression and fusion (ACDF) with stand-alone tricortical iliac crest autograft versus stand-alone polyetheretherketone (PEEK) cage in cases of cervical spondylotic myelopathy.

Prospectively collected data of 60 patients in each group were compared.

There was statistically significant improvement noted in postoperative Modified Japanese Orthopaedic Association (MJOA) follow-up scores with comparison pairs of preoperative versus 6 months, preoperative versus 1 year, and 3 months versus 6 months, 3 months versus 1 year in both groups. But improvements in MJOA scores were statistically insignificant between 6 months and 1 year ($P = .0639$) for the autograft group when compared with PEEK cage group ($P = 0001$). The mean loss of segmental lordosis on follow-up X-ray for the autograft group was ($5.89 \pm 2.90°$), which was significantly higher ($1.88 \pm 2.77°$) than the mean loss seen in the PEEK cage group ($P = .01$). This was most evident between 6 months and 1 year, resulting in plateauing of the improvement in MJOA score between 6 months to 1 year in the autograft group. While there was no statistical difference between

fusion rates between the groups for 1 and 2 levels of ACDF, overall fusion rates were significantly better for 1-level ACDF (95.74%) when compared with 2-level ACDF (76.00%).

ACDF with PEEK cage is the fusion technique of choice for cervical fusion with fewer complications and better functional recovery in the treatment of cervical spondylotic myelopathy [2].

**2017**

Seventy-eight patients underwent two consecutive levels PEEK cage-assisted Anterior cervical discectomy and fusion (ACDF) without plating (56 patients) or supplemented with plating (22 patients). The average clinical follow-up was 31.40±12.98months.

Perrini et al. compared clinical parameters (Neck disability index and Robinson criteria), perioperative parameters (hospital stays, complications), and radiological parameters (global cervical lordosis, segmental lordosis, segmental height).

Demographic features, neurological presentation, preoperative sagittal alignment, postoperative complications, length of hospitalization and clinical improvement were not different between groups. At 12-months radiological follow-up, the global lordotic curvature was similar in both groups (P=0.02). However, the use of anterior plate fixation versus stand-alone cage was associated with greater segmental lordosis (-7.68±4.82° versus -0.02±8.44°, P<0.0001) and greater segmental height (39.51±3.50 versus 36.75±3.90, P=0.005).

The clinical outcomes after two consecutive levels PEEK cage-assisted ACDF with and without plate fixation were similar, but the supplement of an anterior plate was advantageous for improving segmental alignment on long-term radiological follow-up [3].

**2008**

19 patients with 25 discs underwent anterior cervical discectomy and interbody fusion (ACDF) in which polyetheretherketone (PEEK) cages were filled with freeze-dried cancellous allograft bone. This kind of bone graft was made from femoral condyle that was harvested during total knee arthroplasty. Patient age at surgery was 52.9 (28-68) years. All patients were followed up at least 1 year. We measured the height of the disc and segmental sagittal angulation by pre-operative and post-operative radiographs. CT scan of the cervical spine at 1 year was used to evaluate fusion rates. Odom's criteria were used to assess the clinical outcome. All interbody disc spaces achieved successful union at 1-year follow-up. The use of a PEEK cage was found to increase the height of the disc immediately after surgery (5.0 mm pre-operatively, 7.3 mm immediately post-operatively). The final disc height was 6.2 mm, and the collapse of the disc height was 1.1 mm. The segmental lordosis also increased after surgery (2.0 degrees pre-operatively, 6.6 degrees immediately post-operatively), but the mean loss of lordosis correction was 3.3 degrees at final follow-up. Seventy-four percent of patients (14/19) exhibited excellent/good clinical outcomes. Analysis of the results indicated the cancellous allograft bone-filled PEEK cage used in ACDF is a good choice for patients with cervical disc disease, and avoids the complications of harvesting iliac autograft [4].

**2007**

From July 2004 to June 2005, 19 patients with 25 discs underwent anterior cervical discectomy and interbody fusion (ACDF) in which polyetheretherketone (PEEK) cages were filled with freeze-dried cancellous allograft bone. This kind of bone graft was made from femoral condyle that was harvested during total knee arthroplasty. Patient age at surgery was 52.9 (28-68) years. All patients were followed up at least 1 year. We measured the height of the disc and segmental sagittal angulation by pre-operative and post-operative radiographs. CT scan of the cervical spine at 1 year was used to evaluate fusion rates. Odom's criteria were used to assess the clinical outcome. All interbody disc spaces achieved successful union at 1-year follow-up. The use of a PEEK cage was found to increase the height of the disc immediately after surgery (5.0 mm pre-operatively, 7.3 mm immediately post-operatively). The final disc height was 6.2 mm, and the collapse of the disc height was 1.1 mm. The segmental lordosis also increased after surgery (2.0 degrees pre-operatively, 6.6 degrees immediately post-operatively), but the mean loss of lordosis correction was 3.3 degrees at final follow-up. Seventy-four percent of patients (14/19) exhibited excellent/good clinical outcomes. Analysis of the results indicated the cancellous allograft bone-filled PEEK cage used in ACDF is a good choice for patients with cervical disc disease, and avoids the complications of harvesting iliac autograft [5].

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Lee JS, Son DW, Lee SH, Ki SS, Lee SW, Song GS, Woo JB, Kim YH. The Effect of Hounsfield Unit Value with Conventional Computed Tomography and Intraoperative Distraction on Postoperative Intervertebral Height Reduction in Patients Following Stand-Alone Anterior Cervical Discectomy and Fusion. J Korean Neurosurg Soc. 2021 Dec 29. doi: 10.3340/jkns.2021.0131. Epub ahead of print. PMID: 34963207.

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3)
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