The Impact of Smoking Anterior Cervical Diskectomy and Fusion with Standalone Cages: Radiological and Functional Outcomes

Cassie Yang, Ngoh Xian Jun, Soh Chee Cheong Reuben, Chen Li Tat John, Ou Yang Youheng

Introduction: Standalone cages for anterior cervical discectomy and fusion (SA-ACDF) are simpler to implant but exhibit higher subsidence rates than traditional plate and screw constructs. Smoking is a recognized risk factor for subsidence, though several studies suggest functional outcomes remain unaffected. We hypothesized that smoking exacerbates subsidence after SA-ACDF, resulting in worse functional outcomes.

Methods: A retrospective review of patients who underwent primary single (SL) and double-level (DL) SA-ACDF from 2015–2022 was performed. Patients were categorized as Non-Smokers (NS) or Current/Ex-Smokers (CES). Patients with diagnosis of cervical myelopathy, radiculopathy, or myeloradiculopathy, age range 40–90 years were included. Patients with prior cervical spine surgery, tumor, or infection diagnosis were excluded. Data collected included patient biodata (age, gender, number of operated levels), radiological outcomes (1-year postoperative subsidence rates, 1-year Δtotal intervertebral height (TIH), 1-year Δlordotic angle), and functional outcomes (Japanese Orthopedic Association Score (JOAS), Neck Disability Index (NDI), Visual Analogue Scores for Neck Pain (VASNP) and Upper Limb Pain (VASLP) preoperatively, at 6 months, and at 2 years).

Results: 23 CES and 48 NS were identified. Between the groups, there were no significant differences in age or levels operated ($p>0.05$). A higher proportion of the CES group were males ($p=0.001$). Radiological Outcomes of CES vs NS: Subsidence rate at 1 year was 60.9% (n=14) vs 35.4% (n=17) ($p=0.043$). The ΔTIH was 2.4mm vs -1.7mm ($p=0.038$), ΔLordotic Angle was -4.1° vs -3.8° ($p=0.78$) and fusion rate was 91.3% (n=21) Vs 89.5% (n=43) ($p=0.82$). Functional Outcomes of CES vs NS: Preoperative JOAS was 11.4 vs 11.8, NDI 45.9 vs 35.4, VASNP 6.1 vs 4.1, and VASLP: 4.3 vs 2.3. At two years postoperatively, JOAS was 15.0 vs 14.8, NDI 19.8 vs 9.6, VASNP 2.4 vs 1.0 and VASLP was 2.1 vs 0.5. Improvement in all functional scores were found after surgery ($p<0.05$). The rate of functional improvements were similar ($p>0.05$). CES demonstrated persistently worse NDI, VASNP and VASLP scores ($p<0.05$) at all time periods. Smoking did not affect JOA scores.

Conclusion: In SA-ACDF, smoking is linked to significantly worse radiological and functional outcomes. Subsidence rates are almost twice as high in smokers. NDI, VASNP, and VASLP scores improve post-surgery but remain about twice as elevated in smokers at 2 years postoperatively.