## Comparative Analysis of Outcomes in Athletes and Labor-Intensive Workers Undergoing Anterior Cervical Discectomy and Fusion versus Anterior Cervical Disc Replacement for Cervical Spondylosis

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INTRODUCTION: Cervical spondylosis (CS) commonly affects individuals in their fifth decade of life. Accelerated degeneration can be due to congenital conditions, exposure to spinal trauma, or engagement in recreational or occupational athletic activity. When symptomatic CS is unresponsive to conservative therapy, surgical intervention is often required to improve quality of life and aid return to work and play. Two surgical options include anterior cervical discectomy and fusion (ACDF) and anterior cervical disc replacement (ACDR). This study evaluates complications, outcomes, and return-to-play/work (RTP/W) in athletes or patients with physically demanding occupations following ACDF or ACDR.

METHODS: A retrospective review of patients who regularly engage in recreational physical activity or perform laborintensive jobs (law enforcement, nursing, construction, personal training) were evaluated. Patient demographics were analyzed. Patients were followed periodically for at least 24 months following surgery. Revision and complication rates were recorded. Perioperative data including estimated blood loss (EBL), operative time and length of stay (LOS) was examined. Complications such as dysphonia, dysphagia, infection, hardware failure, pseudoarthrosis, adjacent segment degeneration (ASD), and revision operations were examined. Patient-reported outcome measures (PROMs) were assessed with visual analog scores for neck pain (VAS-n) and neck disability index (NDI).

RESULTS: 130 total patients were included (100 ACDF and 30 ACDR). Baseline characteristics, including follow-up time, body mass index (BMI), the proportion of males, smokers, and those suffering from diabetes and COPD, were similar between the two groups. However, patients in the ACDR cohort were significantly older than those in the ACDF cohort (ACDF: 49.6 years vs ACDR: 43.2, p=0.002). Additionally, patients who underwent ACDF had more operative levels (1.63 vs. 1.27, p=0.003), a longer operative time (113.6 min vs. 95.0, p=0.018), and a longer LOS (1.91 days vs. 1.04, p=0.005). Complication rates, including dysphagia, dysphonia, infection, hardware failure, and rate of revisions, were similar. Rates of ASD approached significance (ACDF: 15% vs. ACDR: 3.3%, P=0.093). RTP/W was similar (ACDF: 220.8 days vs ACDR: 205.4, p=0.620). VAS-n scores were similar between the two cohorts at every follow-up period. Patients in the ACDR cohort experienced greater improvements in NDI scores (ACDF: -18.4 vs. ACDR: -22.7, p< 0.001).

DISCUSSION AND CONCLUSION: ACDF and ACDR are excellent options for treating athletes and patients with highly physical jobs suffering from CS. This study demonstrated similar complication rates and RTP/W between the two cohorts. Additionally, patients in the ACDR cohort experienced greater improvements in NDI scores.