Titanium-Coated Polyetheretherketone Cages versus Uncoated Polyetheretherketone Cages for Lumbar Spinal Fusion: A systematic review and Meta-Analysis

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INTRODUCTION:
The choice of implant material plays a crucial role in spinal fusion as it directly affects the success of the procedure. The implant material not only provides mechanical stability, but also influences the process of bone integration and fusion. selection of the most suitable material is essential to promote optimal healing, reduce complications, and enhance long-term outcomes. While titanium demonstrates osteointegration, PEEK allows for radiographic monitoring. TiPEEK combines these advantages, but comparative evidence is limited. The objective of this study was to compare the fusion rates, functional outcomes, and complications between TiPEEK and PEEK cages through a systematic review and meta-analysis of comparative studies.
METHODS:
Four databases were systematically searched for studies that included adult patients who underwent one- or two-level lumbar fusion with TiPEEK or PEEK cages. The rate of fusion, compications rate and pateint repoerted outcomes qere compared between the two devices. Study quality was assessed using the Cochrane Risk of Bias tool and MINORS criteria. The meta-analysis was performed using Review Manager 5.4. Heterogeneity was assessed using I2, and random effects were used to analyze the heterogeneity.
RESULTS:
Eight studies (n=670) were analyzed. TiPEEK showed a significantly higher overall fusion rate (OR 1.71, 95%CI 1.36-2.14). No differences were observed in the global ODI (SMD -0.04, 95%CI -0.15-0.06). TiPEEK significantly reduced cage subsidence at 24 months (OR 0.14, 95%CI 0.03-0.70) but not screw complications (OR 1.25, 95%CI 0.30-5.27) or reoperations (OR 0.61, 95%CI 0.11-3.37). TiPEEK demonstrated higher fusion at 3-6 months but equivalent function, global subsidence, and other complications.
DISCUSSION AND CONCLUSION: In conclusion, the TiPEEK cages demonstrated a significantly higher overall fusion rate than the uncoated PEEK cages, particularly within the first six months. Patient-reported outcome measures and complications did not show significant differences between the groups