Hydroxyapatite-infused cervical PEEK cage

A hydroxyapatite-infused Cervical PEEK Cage is a medical device used in cervical spine surgeries, specifically in procedures such as cervical disc replacement or cervical fusion. Let's break down the key components:

Polyetheretherketone (PEEK): PEEK is a high-performance thermoplastic polymer known for its biocompatibility and mechanical properties similar to bone. It is commonly used in medical implants, especially in spinal surgery, due to its ability to provide stability, flexibility, and clear imaging in medical scans.

Hydroxyapatite (HA): Hydroxyapatite is a biocompatible ceramic material that is a form of calcium phosphate, a major component of natural bone. In medical applications, including spinal implants, HA is often incorporated or coated onto the implant's surface to enhance osseointegration. This improves the interaction between the implant and the surrounding bone, promoting bone growth and integration.

Cervical Cage: A cervical cage is a type of intervertebral implant designed for use in the cervical spine (neck region). It is typically placed between two adjacent cervical vertebrae to maintain disc height, provide stability, and potentially facilitate spinal fusion.

In a hydroxyapatite-infused Cervical PEEK Cage, the hydroxyapatite is integrated into or onto the PEEK material, usually on the surface of the cage. This infusion of hydroxyapatite aims to enhance the bone-implant interface in the cervical spine. The hydroxyapatite component encourages osseointegration, reducing the risk of implant migration and promoting a stable connection between the cage and the cervical vertebrae.

This type of implant is employed in cervical spine surgeries to treat conditions such as cervical disc degeneration, herniation, or instability. The combination of PEEK and hydroxyapatite is intended to provide a balance of mechanical strength and bioactive properties to support optimal healing and fusion in the cervical spine.

A multicenter observational registry analysis of 1-year radiographic and clinical outcomes following anterior cervical discectomy and fusion (ACDF) using hydroxyapatite-infused cervical PEEK cage.

Radiographic and clinical outcome data were collected preoperatively and at 6 weeks, 3 months, 6 months, and 12 months postoperatively. To assess fusion, dynamic flexion-extension radiographs were independently evaluated with a validated method. Clinical outcomes were assessed using the following disease-specific measures: Neck Disability Index (NDI) and visual analog scale (VAS) for neck, left arm, and right arm pain. Patient satisfaction was also evaluated.

A total of 789 ACDF patients (men: 51.5 %/women: 48.5%; mean body mass index: 29.9 kg/m2) were included at the time of analysis, and 1565 segments have been operated. Successful fusion was confirmed in 91.3% of all operated levels after 6 months and 92.2% after 12 months. Mean NDI scores improved significantly ($P < 0.01$) preoperatively (46.3, $n = 771$) to postoperatively (12 months: 25.2, $n = 281$). Consistently, mean VAS neck (preoperative: 64.2, $n = 770$; 12 months: 28.6, $n = 278$), VAS right arm (preoperative: 42.6, $n = 766$; 12 months: 20.4, $n = 277$), and VAS left arm (preoperative: 41.1, $n = 768$; 12 months: 20.8, $n = 277$) decreased significantly ($P < 0.01$). Patients reported high

satisfaction rates after surgery with no significant changes in postoperative patient satisfaction between 6 weeks and 12 months (95.1%, n = 273).

ACDF with HA-infused PEEK cages demonstrates promising radiographic and clinical outcomes, supporting the potential benefits of incorporating HA into PEEK cages to enhance fusion rates and improve patient outcomes.

Clinical relevance: This study demonstrates a >90% fusion rate by level with reliable improvements in patient-reported outcomes, along with a high rate of patient satisfaction, in a large patient cohort undergoing ACDF with HA-infused PEEK cages [1].

1)
Kelly MJ, Gelfand B, Radcliff K, Mo FF, Felix BA, Babak Kalantar S. Interim 1-Year Radiographic and Clinical Outcomes Following Anterior Cervical Discectomy and Fusion Using Hydroxyapatite-Infused Polyetheretherketone Interbody Cages. Int J Spine Surg. 2024 Feb 20:8585. doi: 10.14444/8585. Epub ahead of print. PMID: 38378231.