

Custom made cranioplasty of porous hydroxyapatite

Although the porous [hydroxyapatite](#) (PHA) used in [custom made cranioplasty](#) implants is a material appreciated for its biomimetic properties, before osteointegration it is initially very fragile. The fragility of custom-made PHA cranioplasty implants increases if the surgeon fails to achieve a precise design and validation, and/or an accurate surgical procedure. Nevertheless, careful attention during these phases helps to maintain the strength of the implant, given the more favorable mechanical conditions, without interfering with its biomimetic capacity ¹⁾.

Case series

2017

Over a 6-year time period, 41 patients underwent cranioplasty using a custom-made three-dimensional hybrid pore structured hydroxyapatite (3DHPoHAp) implant. The surgical techniques and histological evaluations of 3DHPoHAp in 2 cases, removed 6 months and 2.5 years after cranioplasty, are described.

Using 3DHPoHAp, cranioplasty was successfully performed for all patients. The implant fit the bone defect exactly, and surgical manoeuvres were simple and easy. All implants were firmly fixed using a titanium plate, and postoperative infection occurred in 1 patient (2.4%). New bone formation was seen in 2 cases 6 months and 2.5 years after cranioplasty. Osteoblasts were progressing to the stoma at various depths, and bone tissue had ripened. Furthermore, lamellar structure was observed in the case at 2.5 years.

In this study, there was a low infection rate, and new bone formation was seen in vivo after cranioplasty. This study also demonstrated that the 3DHPoHAp implant is a good candidate for cranial bone implants because its good osteoconductivity and biocompatibility ²⁾.

2012

Sixty patients treated surgically with a customised porous-HA prosthesis for large cranial defects, were followed retrospectively. A two-year follow-up was carried out with periodic visits and CT scans. Safety (the incidence of adverse events and fractures of the implant) and clinical performance (biological and cosmetic results) were evaluated.

Fifty one patients were followed-up, no rejection occurred and only one case of infection was recorded. Five patients had minor surgery-related complications, and no spontaneous implant fractures or mobilisation were reported. Three patients exhibited implant fractures as a result of trauma and all healed spontaneously. All patients showed a satisfactory clinical outcome with good cosmetic appearance in the early postoperative period and after a long-term follow-up.

Cranioplasty performed with a customised porous-HA prosthesis gave a positive outcome, showing it to be an appropriate technique for use in large and complex cranial reconstruction ³⁾.

¹⁾

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